Automatic Transmission - 4L60-E/4L65-E Diagnosis (DTC P0218 To DTC P2771) - Hummer H2

AUTOMATIC TRANSMISSION (DTC P0218 TO DTC P2771)

DTC P0218

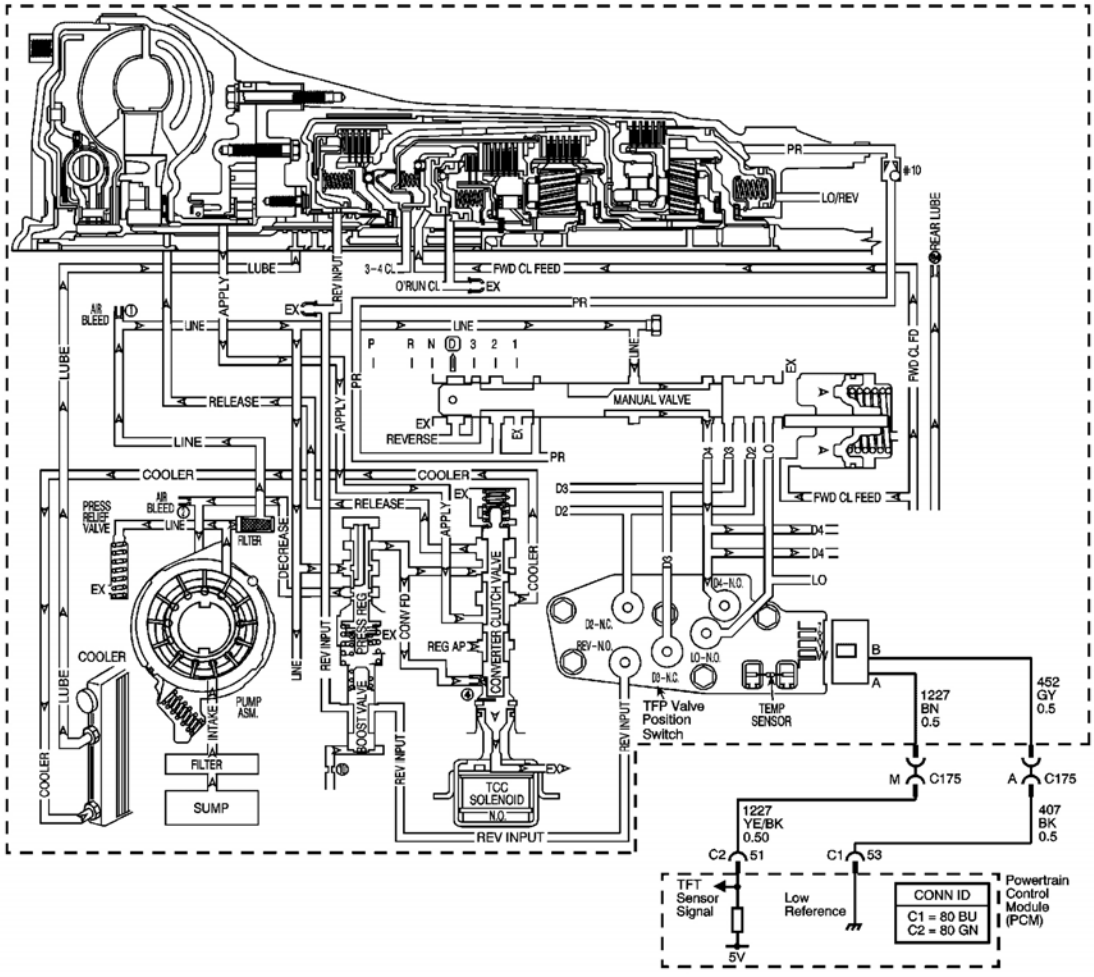

Fig. 1: Filter, Control Valve Body Assembly, Transmission Case & Oil Pump Assembly
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The flow of transmission fluid starts in the bottom pan and is drawn through the filter, control valve body assembly, transmission case and into the oil pump assembly. The oil pump assembly pressurizes the fluid and directs it to the pressure regulator valve where it becomes the main supply of fluid to the various components and hydraulic circuits in the transmission. Hot fluid exiting the torque converter flows through the converter

clutch apply valve and into the transmission cooler lines to the oil cooler located in the vehicle radiator, and auxiliary cooler if equipped. From the cooler, fluid returns to cool and lubricate the front of the transmission. In forward drive ranges, D4 fluid from the manual valve is routed through an orificed cup plug in the rear of the transmission case to feed the rear lube fluid circuit.

When the powertrain control module (PCM) detects a high transmission fluid temperature (TFT) for a long period of time, then DTC P0218 sets. DTC P0218 is a type C DTC.

Conditions for Running the DTC

- No TFT sensor DTCs P0711, P0712 or P0713.
- The ignition switch is ON for 5 seconds.

Conditions for Setting the DTC

The TFT is greater than 130°C (266°F) for 600 seconds (10 minutes).

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- TRANS HOT...IDLE ENGINE message displays on the driver information center (DIC).
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0218 in PCM history.

Conditions for Clearing the DIC/DTC

- The PCM clears the DIC message when the condition no longer exits.
- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- The scan tool Trans. Fluid Temp. should rise steadily to a normal operating temperature, then stabilize.
- Ask about the customer's driving habits, trailer towing, etc. Trailer towing should occur in D3.

Refer to **Symptoms - Automatic Transmission** .

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step inspects for air flow restrictions or damage which may result in the transmission overheating.

DTC P0218

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM.** 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Inspect for correct transmission fluid level. Refer to **Transmission Fluid Checking Procedure** . Did you perform the fluid checking procedure?	-	Go to **Step 3**	Go to **Transmission Fluid Checking Procedure**
3	1. Inspect the engine cooling system and transmission cooling system for the following conditions: • Air flow restrictions • Air flow blockage • Debris 2. Inspect the transmission cooling system for damaged cooler lines. 3. Test the oil cooler flow. Refer to **Automatic Transmission Oil Cooler Flushing and Flow Test (J 45096)** or **Automatic**	-		

	Transmission Oil Cooler Flushing and Flow Test (J 35944-A) . Did you find and correct the condition?		Go to **Step 6**	Go to **Step 4**
4	Test for correct line pressure. Refer to **Line Pressure Check Procedure** . Did you find and correct the condition?	-	Go to **Step 6**	Go to **Step 5**
5	Test the torque converter stator. Refer to **Torque Converter Diagnosis Procedure** . Did you find and correct the condition?	-	Go to **Step 6**	Go to Diagnostic Aids
6	Perform the following procedure in order to verify the repair: 1. Install a scan tool. 2. Select DTC. 3. Select Clear Info. 4. Start and idle the engine until it reaches normal operating temperature. 5. Monitor Engine Run Time and Trans. Fluid Temp. on the scan tool. 6. Drive the vehicle for 10 minutes. 7. Ensure that the transmission fluid temperature has stabilized and is less than 129°C (264°F). 8. Select Specific DTC. 9. Enter DTC P0218. Has the test run and passed?	-	Go to **Step 7**	Go to **Step 2**
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0502

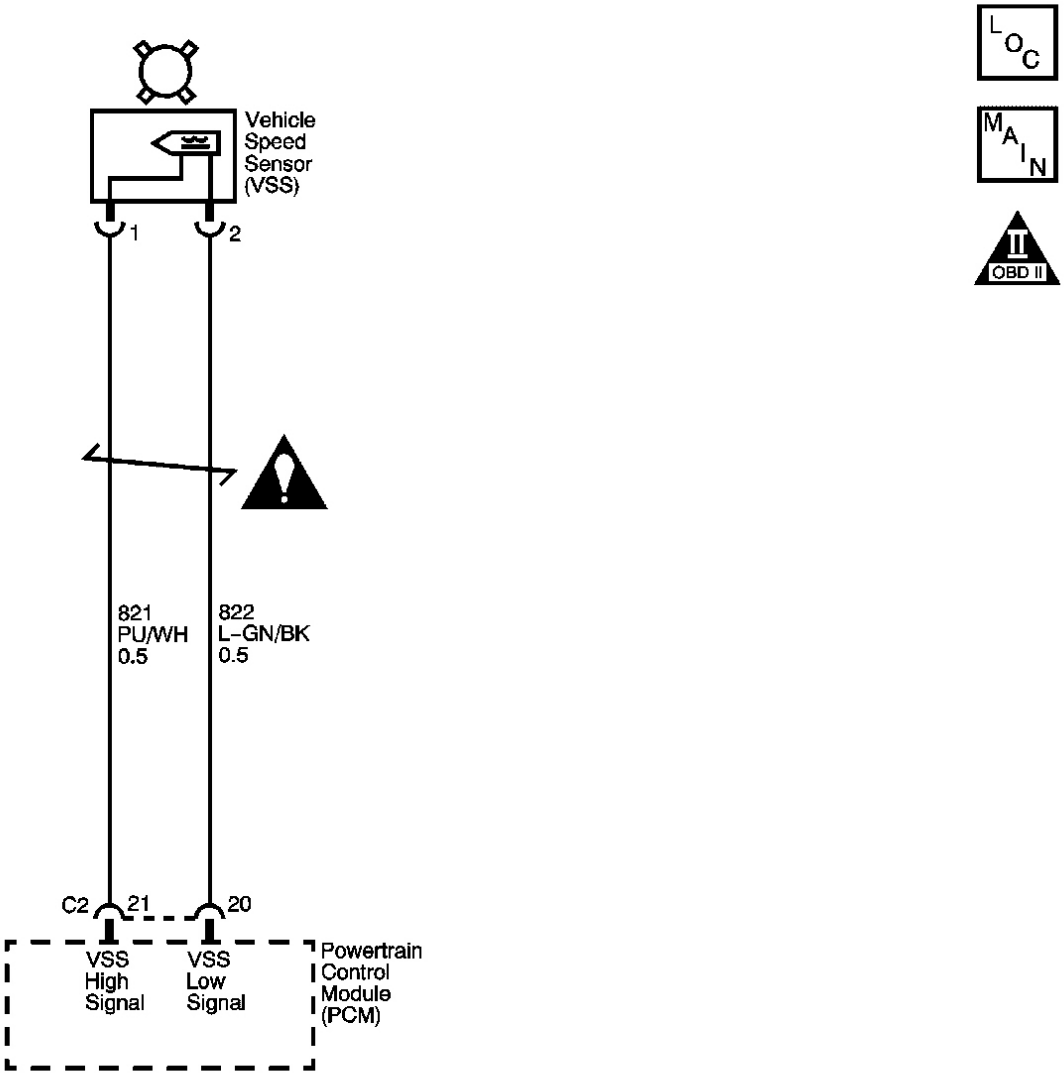

Fig. 2: Vehicle Speed Sensor (VSS) Assembly Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The vehicle speed sensor (VSS) assembly provides vehicle speed information to the powertrain control module (PCM). The VSS assembly is a permanent magnet generator. The VSS produces an AC voltage as rotor teeth on the output shaft of the transfer case pass through the sensor's magnetic field. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. The PCM converts the pulsing voltage to vehicle speed. The PCM uses the vehicle speed signal to determine shift timing and torque converter clutch (TCC) scheduling.

When the PCM detects a low vehicle speed when there is a high engine speed in a drive gear range, then DTC

P0502 sets. DTC P0502 is a type B DTC.

Conditions for Running the DTC

- No MAP sensor DTCs P0107 or P0108.
- No TP sensor DTCs P0122 or P0123.
- No TFP manual valve position switch DTC P1810.
- The engine torque is 54-542 N.m (40-400 lb ft).
- The TP angle is greater than 12 percent.
- The engine speed is greater than 3,000 RPM.
- The transmission is not in PARK or NEUTRAL.

Conditions for Setting the DTC

The transmission output speed is less than 150 RPM for 3 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands second gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0502 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests the VSS assembly circuit.

4: This step tests the integrity of the VSS assembly.

DTC P0502

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Raise and support the rear axle assembly. 6. Start the engine. 7. Place the transmission in any drive range. With the drive wheels rotating, does the scan tool Transmission OSS increase with the drive wheel speed?	-	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C2. 3. Using the DMM and the **J 35616** GM Terminal Test Kit, measure the resistance between harness connector terminals C2-20 and C2-21. Does the resistance measure within the specified range?	976-2354 ohm	Go to **Step 4**	Go to **Step 7**
	1. Place the transmission in NEUTRAL. 2. Select AC volts.			

4	3. Prevent one rear wheel from turning. 4. Rotate the other rear wheel by hand, ensuring that the driveshaft is turning. Does the voltage measure greater than the specified value?	0.5 V	Go to **Step 5**	Go to **Step 12**
5	Measure the resistance from terminal C2-21 to ground. Does the resistance measure greater than the specified value?	50 K ohm	Go to **Step 6**	Go to **Step 9**
6	1. Reconnect the PCM connector C2. 2. Disconnect the engine wiring harness from the VSS assembly. 3. Turn ON the ignition, with the engine OFF. 4. Test the high circuit of the VSS assembly for a short to power. Refer to **Testing for a Short to Voltage** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 15**	Go to **Step 14**
7	1. Disconnect the engine wiring harness from the VSS assembly. 2. Measure the resistance of the VSS assembly. Does the resistance measure within the specified range?	976-2354 ohm	Go to **Step 8**	Go to **Step 13**
8	Was the resistance measured in Step 3 greater than the specified value?	2354 ohm	Go to **Step 10**	Go to **Step 11**
9	Test the high circuit of the VSS assembly for a short to ground. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 15**	-
	1. Test the high circuit of the VSS assembly for an open. 2. Test the low circuit of the VSS assembly for an open.			

10	Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 15**	-
11	Test the high circuit and the low circuit of the VSS assembly for a short together. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 15**	-
12	1. Remove the VSS assembly. 2. Inspect the output shaft speed sensor rotor for damage or misalignment. 3. Inspect the case extension bushing for wear. Did you find and correct the condition?	-	Go to **Step 15**	Go to **Step 13**
13	Replace the VSS assembly. Refer to **Vehicle Speed Sensor (VSS) Replacement** . Did you complete the replacement?	-	Go to **Step 15**	-
14	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 15**	-
15	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle, so that the transmission output speed is greater than 250 RPM for 2 seconds. 4. Select Specific DTC. 5. Enter DTC P0502. Has the test run and passed?	-	Go to **Step 16**	Go to **Step 2**
16	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls -	

			6.0L (LQ4)	System OK

DTC P0503

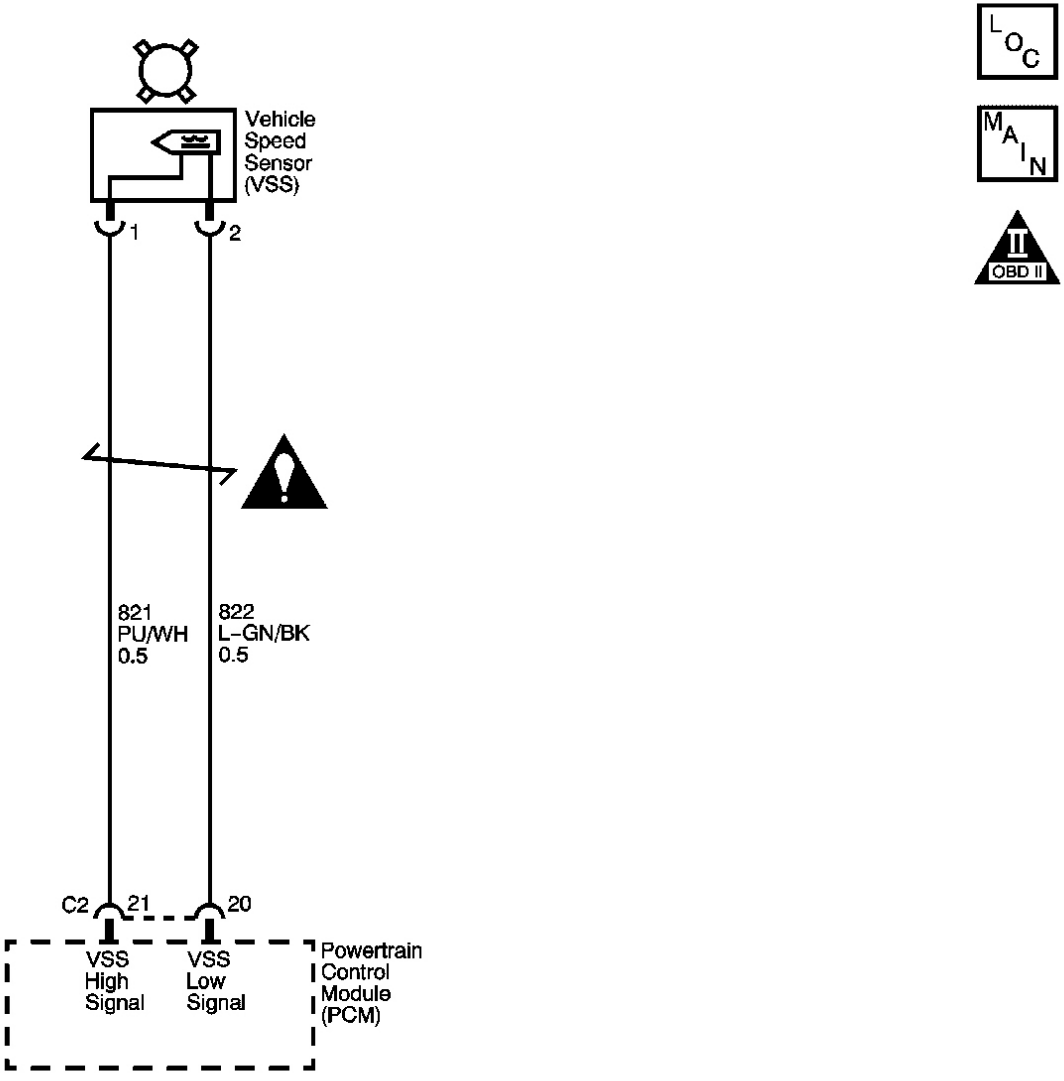

Fig. 3: Vehicle Speed Sensor (VSS) Assembly Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The vehicle speed sensor (VSS) assembly provides vehicle speed information to the powertrain control module (PCM). The VSS assembly is a permanent magnet generator. The VSS produces an AC voltage as rotor teeth on the output shaft of the transfer case pass through the sensor's magnetic field. The AC voltage level and the number of pulses increase as the speed of the vehicle increases. The PCM converts the pulsing voltage to

vehicle speed. The PCM uses the vehicle speed signal to determine shift timing and torque converter clutch (TCC) scheduling.

When the PCM detects an unrealistically large drop in vehicle speed, then DTC P0503 sets. DTC P0503 is a type B DTC.

Conditions for Running the DTC

- No TFP manual valve position switch DTC P1810.
- The engine speed is greater than 450 RPM.
- The time since the last gear range change is greater than 6 seconds.
- The time since the last AWD low state change is greater than 6 seconds.
- The transmission output speed rise does not exceed 600 RPM within 2 seconds.

Conditions for Setting the DTC

The transmission output speed drop is greater than 1,300 RPM for 3 seconds when the transmission is not in PARK or NEUTRAL.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands a soft landing to second gear.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits fourth gear if the transmission is in hot mode.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0503 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0503.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests the VSS assembly circuit.

4: This step tests the integrity of the VSS assembly.

DTC P0503

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Raise and support the rear axle assembly. 6. Start the engine. 7. Place the transmission in D3 range. 8. With the drive wheels rotating, slowly accelerate to 2,000 engine RPM and hold. Road test the vehicle if necessary. Does the scan tool Transmission OSS drop or fluctuate more than the specified value?	1,300 RPM	Go to **Step 3**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)
3	1. Turn OFF the ignition. 2. Disconnect the PCM connector C2. 3. Using the DMM and the **J 35616** GM Terminal Test Kit, measure the resistance	976-2354		

	between harness connector terminals C2-20 and C2-21. Does the resistance measure within the specified range?	ohm	Go to **Step 4**	Go to **Step 7**
4	1. Place the transmission in NEUTRAL. 2. Select AC volts. 3. Prevent one rear wheel from turning. 4. Rotate the other rear wheel by hand, ensuring that the driveshaft is turning. Does the voltage measure greater than the specified value?	0.5 V	Go to **Step 5**	Go to **Step 12**
5	Measure the resistance from terminal C2-21 to ground. Does the resistance measure greater than the specified value?	50 K ohm	Go to **Step 6**	Go to **Step 9**
6	1. Reconnect the PCM connector C2. 2. Disconnect the engine wiring harness from the VSS assembly. 3. Turn ON the ignition, with the engine OFF. 4. Test the high circuit of the VSS assembly for a short to voltage. Refer to **Testing for a Short to Voltage** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 15**	Go to **Step 14**
7	1. Disconnect the engine wiring harness from the VSS assembly. 2. Measure the resistance of the VSS assembly. Does the resistance measure within the specified range?	976-2354 ohm	Go to **Step 8**	Go to **Step 13**
8	Was the resistance measured in Step 3 greater than the specified value?	2354 ohm	Go to **Step 10**	Go to **Step 11**
9	Test the high circuit of the VSS assembly for a short to ground. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring	-		-

	Systems. Did you find and correct the condition?		Go to **Step 15**	
10	1. Test the high circuit of the VSS assembly for an open. 2. Test the low circuit of the VSS assembly for an open. Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 15**	-
11	Test the high circuit and the low circuit of the VSS assembly for a short together. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 15**	-
12	1. Remove the VSS assembly. 2. Inspect the output shaft speed sensor rotor for damage or misalignment. 3. Inspect the case extension bushing for wear. Did you find and correct the condition?	-	Go to **Step 15**	Go to **Step 13**
13	**IMPORTANT:** **For vehicles equipped with an active transfer case, identify the VSS assembly before replacing. There are two transfer case speed sensors located near the VSS assembly. Refer to the wire colors on the schematic to identify the VSS assembly.** Replace the VSS assembly.Refer to **Vehicle Speed Sensor (VSS) Replacement** .Did you complete the replacement?	-	Go to **Step 15**	-
14	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 15**	-
	Perform the following procedure in order to verify the repair: 1. Select DTC.			

15	2. Select Clear Info. 3. Operate the vehicle, ensuring that the transmission output speed drop is less than 500 RPM for 2 seconds and output speed is greater than 500 RPM for 2 seconds. 4. Select Specific DTC. Enter DTC P0503. Has the test run and passed?	-	Go to **Step 16**	Go to **Step 2**
16	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0706

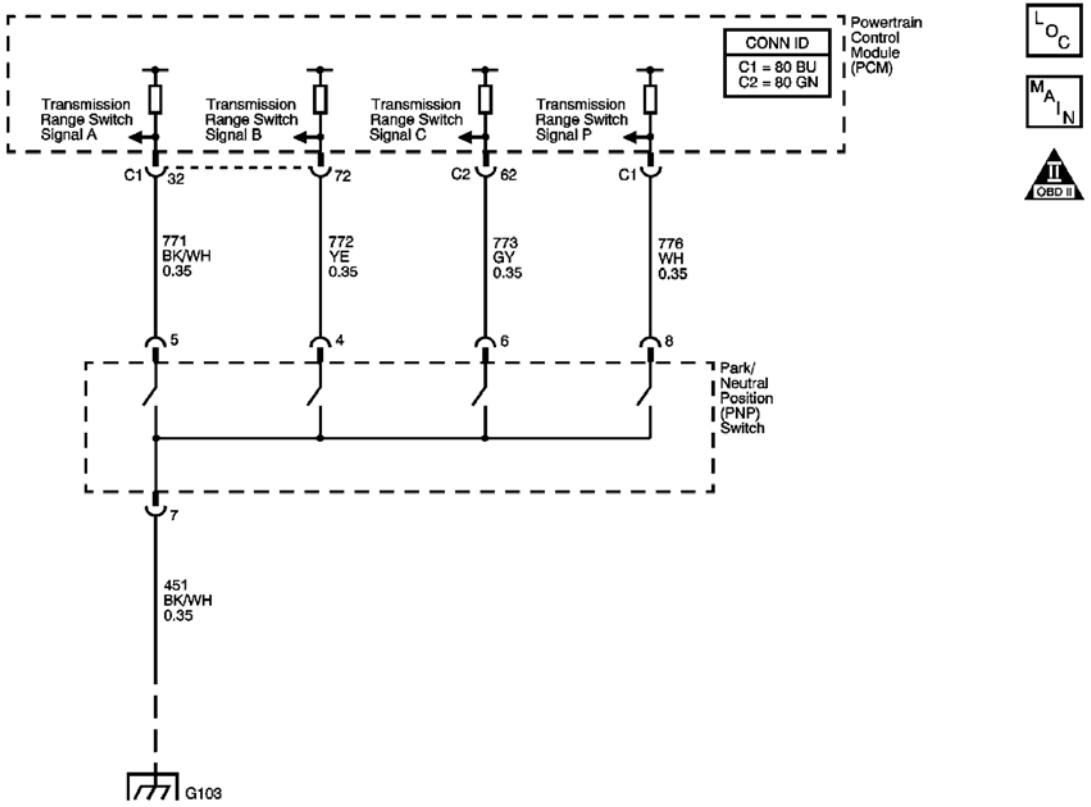

Fig. 4: Transmission Range (TR) Switch Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The transmission range (TR) switch is part of the park/neutral position and back-up lamp switch assembly and is externally mounted on the transmission manual shaft. The TR switch is a multi-signal switch. The PCM supplies ignition voltage to the TR switch on four signal circuits, A, B, C, and P. Each gear selector lever position grounds one or more of the switch circuits. In order to determine the gear range selected by the driver, the PCM compares the voltage combinations on the signal circuits to a look up table stored in the PCM memory. PCM detects the selected gear range by the state change of the switch input. Refer to **Transmission Range Switch Logic** table.

Switch input to the PCM is represented on the scan tool as HI and Low. HI indicates an ignition voltage signal. Low indicates a zero voltage signal. The four parameters represent transmission range switch signal A, B, C and Parity.

DTC P0706 will set if the PCM detects start-up in a drive range or vehicle speed in the PARK or NEUTRAL range. DTC P0706 is a type C DTC.

Conditions for Running the DTC

Transmission is in D4.

Conditions for Setting the DTC

Condition 1

The PCM detects DRIVE or REVERSE at vehicle start-up.

Condition 2

The PCM detects PARK or NEUTRAL and the following conditions occur for 10 seconds:

- TP is 5 percent or greater.
- Engine torque is greater than 68 N.m (50 lb ft).
- VSS is 32 km/h (20 mph) or greater.

Action Taken When the DTC Sets

- The PCM will use TFP Switch to determine gear range.
- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0706 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and the DTC passes.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5: By disconnecting the transmission range switch, the ground path of all TR switch circuits would be removed and the PCM would recognize all circuits as open. The scan tool will display HI for all range signals.

6: This step tests TR switch wiring for an open or the lack of the signal voltage from the PCM.

7: This step tests TR switch wiring and the PCM by providing a ground path through a fused jumper wire. When grounded, the scan tool range signal A should change to LOW.

8: This step tests TR switch wiring and the PCM by providing a ground path through a fused jumper wire. When grounded, the scan tool range signal B should change to LOW.

9: This step tests TR switch wiring and the PCM by providing a ground path through a fused jumper wire. When grounded, the scan tool range signal C should change to LOW.

DTC P0706

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. 3. Select TR Sw. on the scan tool. 4. With the scan tool, observe the TR Sw. display while selecting each transmission range: P, R, N, D3, D2 and D1. Does each selected transmission range match the scan tool TR Sw. display?	-	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 3**
	1. Inspect the PNP switch assembly for the following:			

3	• Damage • Loose or missing mounting hardware • Proper adjustment Refer to **Park/Neutral Position Switch Replacement** . 2. Inspect the shift cable for the following: • Damaged or stretched cable • Proper adjustment Refer to **Automatic Transmission Range Selector Cable Replacement** . Did you find and correct a condition?	-	Go to **Step 16**	Go to **Step 4**
4	With the scan tool, observe the TR Sw. A/B/C/P display. Does the scan tool TR Sw. A/B/C/P parameter indicate HI for all range signal states?	-	Go to **Step 13**	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Disconnect the TR switch connector. 3. Turn ON the ignition, with the engine OFF. Does the scan tool TR Sw. A/B/C/P parameter indicate HI for all range signal states?	-	Go to **Step 6**	Go to **Step 10**
6	1. Using the DMM and the **J 35616** GM Terminal Test Kit, measure the voltage from terminal 8 of the TR switch connector to ground. 2. Measure the voltage from terminal 4 of the TR switch connector to ground. 3. Measure the voltage from terminal 6 of the TR switch connector to ground. 4. Measure the voltage from terminal 5 of the TR switch connector to ground. Does the voltage measure within the specified value at all four terminals?	10-12 V	Go to **Step 7**	Go to **Step 11**
	Connect a fused jumper wire from terminal 5 of the TR switch connector, signal A circuit,			

7	to ground while monitoring the scan tool TR Sw. A/B/C/P parameter. When the signal A circuit is grounded, do any other signal circuits indicate LOW?	-	Go to **Step 12**	Go to **Step 8**
8	Connect a fused jumper wire from terminal 4 of the TR switch connector, signal B circuit, to ground while monitoring the scan tool TR Sw. A/B/C/P parameter. When the signal B circuit is grounded, do any other signal circuits indicate LOW?	-	Go to **Step 12**	Go to **Step 9**
9	Connect a fused jumper wire from terminal 6 of the TR switch connector, signal C circuit, to ground while monitoring the scan tool TR Sw. A/B/C/P parameter. When the signal C circuit is grounded, do any other signal circuits indicate LOW?	-	Go to **Step 12**	Go to **Step 14**
10	Test the signal circuit or circuits of the TR switch that did not indicate HI for a short to ground. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 15**
11	Test the signal circuit or circuits of the TR switch that did not indicate proper voltage for an open. Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 15**
12	Test the affected signal circuits of the TR switch for a shorted together condition. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 15**
13	Test the ground circuit of the TR switch for an open. Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 14**

14	Replace the TR switch, this switch is part of the park/neutral position (PNP) switch. Refer to **Park/Neutral Position Switch Replacement** . Did you complete the replacement?	-	Go to **Step 16**	-
15	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 16**	-
16	Perform the following procedures in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle greater than 8 km/h (5 mph) for a short distance, then stop the vehicle. 4. Select each transmission range: P, R, N, D3, D2 and D1. 5. Place the transmission in PARK. 6. Select Specific DTC. Enter DTC P0706. Has the test run and passed?	-	Go to **Step 17**	Go to **Step 2**
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0711

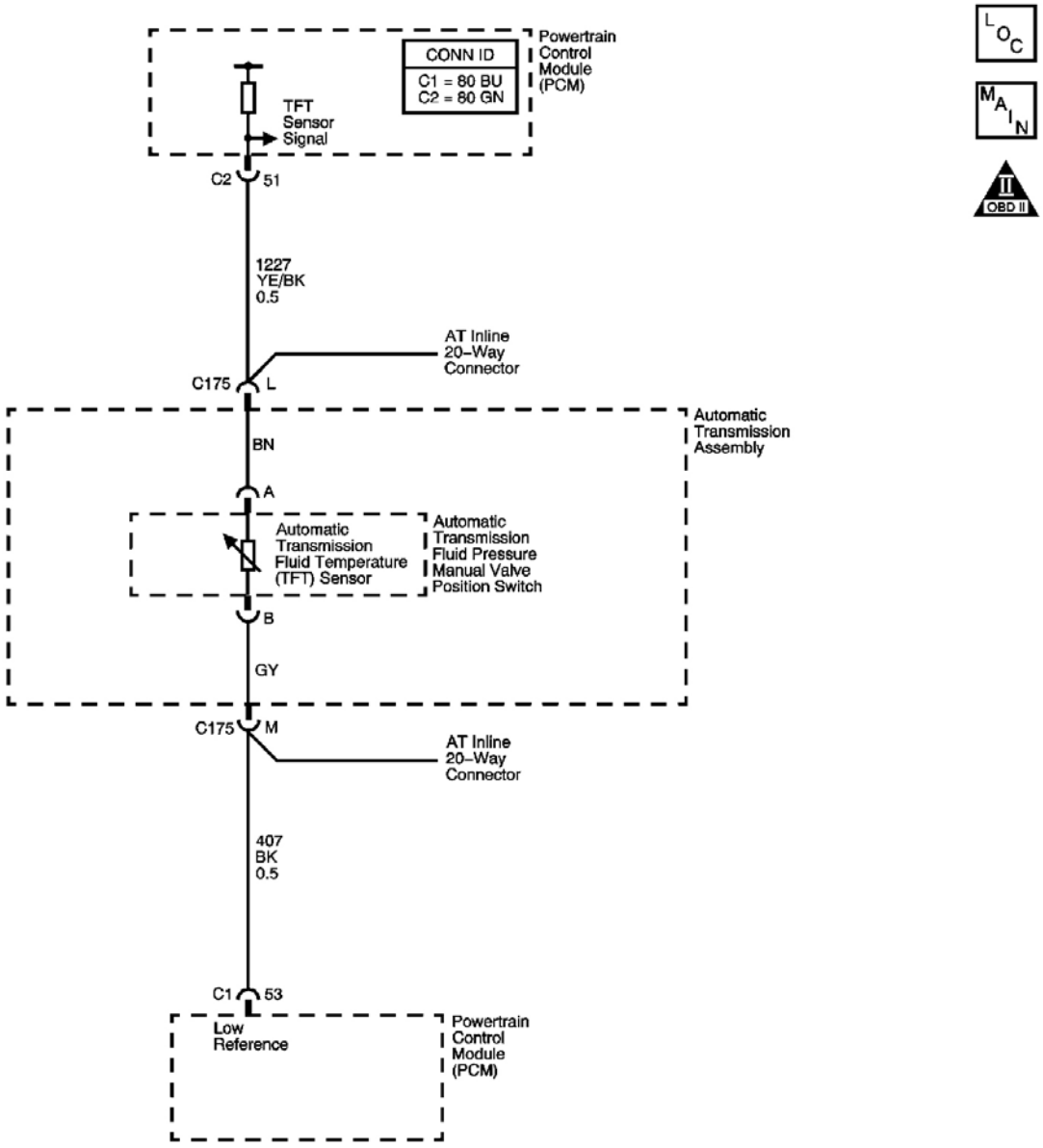

Fig. 5: Automatic Transmission Fluid Temperature (TFT) Sensor
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on the TFT sensor signal circuit and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM

detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects one of the following unusual conditions, then DTC P0711 sets.

- An unrealistically large change in transmission temperature
- A transmission temperature which remains constant for a period of time in which a measurable amount of change is expected

DTC P0711 is a type C DTC.

Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- No Transmission Component Slipping DTC P0894.
- The engine is running for 409 seconds.
- The engine coolant temperature (ECT) is greater than 84°C (151°F) and the temperature has changed by 54°C (97°F) since startup.
- The vehicle speed is greater than 8 km/h (5 mph) for 409 seconds cumulative during the current ignition cycle.
- The TFT at startup is between -40 and +21°C (-40 and +70°F).
- The TFT is between -38 and +151°C (-36 and +304°F).
- The TCC slip speed is greater than 120 RPM for 409 seconds cumulative during the current ignition cycle.

Conditions for Setting the DTC

DTC P0711 sets if one of the following conditions occurs:

Condition 1

The TFT does not change more than 2.25°C (2.7°F) for 409 seconds since startup.

Condition 2

The TFT changes more than 20°C (36°F) in 200 milliseconds 14 times within 7 seconds.

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

IMPORTANT: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:

1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
3. If the engine run time is less than 300 seconds and:
    - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
    - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
4. If the engine run time is greater than 300 seconds and no IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F) and:
    - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8° F).
    - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10° C (16°F).
    - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).

- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0711 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5: This step tests for an intermittent short or open condition in the engine wiring harness. The test lamp is used as a resistor in the circuit.

6: This step determines if the PCM or the TFT sensor is causing a steady, unchanging TFT reading.

DTC P0711

		Value		

Step	Action	(s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	Inspect for correct transmission fluid level. Refer to **Transmission Fluid Checking Procedure** . Did you perform the fluid checking procedure?	-	Go to **Step 3**	Go to **Transmission Fluid Checking Procedure**
3	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM.** 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select Trans. Fluid Temp. on the scan tool. 6. Drive the vehicle and observe the scan tool for either of the following conditions: • The Trans. Fluid Temp. does not change more than 2.25°C (4°F) in 409 seconds since startup. • The Trans. Fluid Temp. changes more than 20°C (36°F) in 200 milliseconds 14 times within 7 seconds. Did either of the conditions occur?	-	Go to **Step 4**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)
4	Did the scan tool display a condition in which the Trans. Fluid Temp. does not change by more than the specified value in 409 seconds since startup?	2.25° C (4° F)	Go to **Step 6**	Go to **Step 5**
	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector, additional DTCs may set. 3. Install the **J 44152** Jumper Harness (20 pins) on the engine side of the AT inline 20-way connector.			

5	4. Using the **J 35616** GM Terminal Test Kit, connect a test lamp from terminal L to terminal M of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . 5. Turn ON the ignition, with the engine OFF. 6. While observing the scan tool display, move or wiggle the engine wiring harness from PCM connectors C1 and C2 to the AT inline 20-way connector. Does the scan tool Trans. Fluid Temp. change by more than the specified value?	20°C (36°F)	Go to **Step 7**	Go to **Step 8**
6	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. Does the scan tool display the same condition as in Step 4?	-	Go to **Step 11**	Go to **Step 10**
7	1. Test the signal circuit of the TFT sensor for an intermittent open or short condition between the PCM connector C2 and the AT inline 20-way connector. 2. Test the low reference circuit of the TFT sensor for an intermittent open or short condition. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 12**	Go to **Step 11**
8	1. Test the signal circuit of the TFT sensor for an intermittent open or short condition between the AT inline 20-way connector and the TFT sensor. 2. Test the low reference circuit of the TFT sensor for an intermittent open or short condition.	-		

	Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems.Did you find an intermittent open or short condition?		Go to **Step 9**	Go to **Step 10**
9	Replace the AT wiring harness assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 12**	-
10	Replace the TFT sensor, this sensor is part of the TFP manual valve position switch. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 12**	-
11	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 12**	-
12	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle and ensure that the following conditions are met: • The Trans. Fluid Temp. changes by more than 2.25°C (4°F) for 11 seconds since startup • The Trans. Fluid Temp. does not change by more than 20°C (36°F) within 200 milliseconds for a period of at least 11 seconds 4. Select Specific DTC. 5. Enter DTC P0711. Has the test run and passed?	-	Go to **Step 13**	Go to **Step 2**
13	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0712

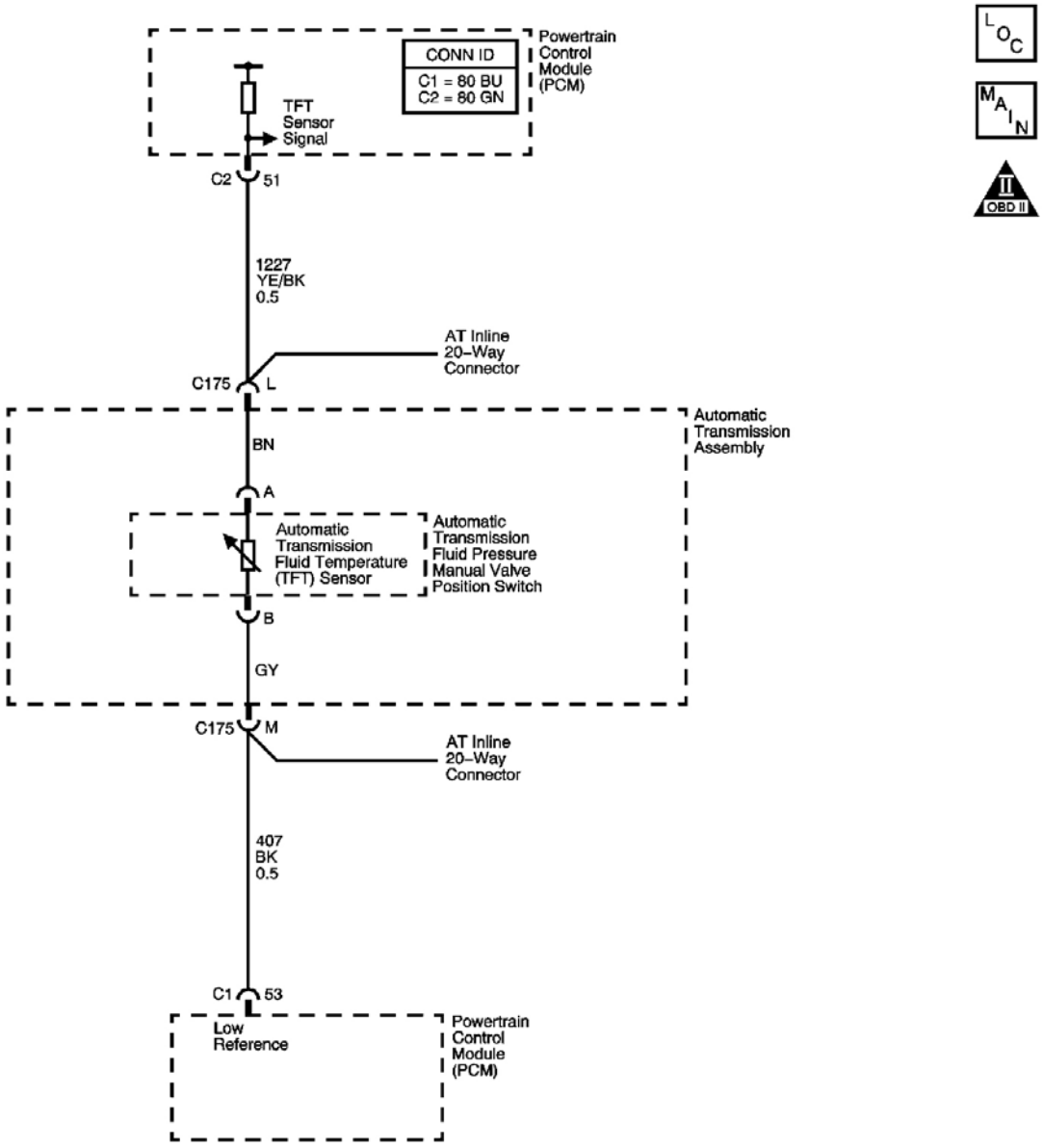

Fig. 6: Automatic Transmission Fluid Temperature (TFT) Sensor
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on the TFT sensor signal circuit and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM

detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects a continuous short to ground in the TFT signal circuit or in the TFT sensor, then DTC P0712 sets. DTC P0712 is a type C DTC.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

The TFT sensor indicates a signal voltage less than 0.25 volts for 10 seconds.

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

IMPORTANT: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:
  1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
  2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
  3. If the engine run time is less than 300 seconds and:
     - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
     - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
  4. If the engine run time is greater than 300 seconds and no IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F) and:
     - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8° F).
     - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10° C (16°F).
     - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
  5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
  6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM

stores this information as Failure Records.

- The PCM stores DTC P0712 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- The scan tool displays the transmission fluid temperature in degrees. After the transmission is operating, the fluid temperature should rise steadily to a normal operating temperature, then stabilize.
- Verify the customer's driving habits, trailer towing, etc. Trailer towing should occur in D3.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests for a short to ground condition.

4: This step tests for an internal fault within the transmission by creating an open.

DTC P0712

Step	Action	Value(s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	Inspect for correct transmission fluid level. Refer to **Transmission Fluid Checking Procedure** . Did you perform the fluid checking procedure?	-	Go to **Step 3**	Go to **Transmission Fluid Checking Procedure**
3	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Failure Records. Using the Clear Info function erases the Failure**	0.2 V		

	Records from the PCM. 3. Record the DTC Failure Records. 4. Clear the DTC. Does the scan tool displays a TFT Sensor signal voltage greater than the specified value?		Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 4**
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector, additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. Does the scan tool displays a TFT Sensor signal voltage greater than the specified value?	4.92 V	Go to **Step 5**	Go to **Step 7**
5	1. Install the **J 44152** Jumper Harness (20 pins) on the transmission side of the AT inline 20-way connector. 2. Using the DMM and the **J 35616** GM Terminal Test Kit, measure the resistance between terminals L and M of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the resistance measure within the specified range?	3088-3942 ohm at 20°C (68°F) 159-198 ohm at 100°C (212°F)	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 6**
6	Test the signal circuit of the TFT sensor for a short to ground between the AT inline 20-way connector and the TFT sensor. Refer to **Testing for Short to Ground** in Wiring Systems. Did you find a short to ground condition?	-	Go to **Step 9**	Go to **Step 8**
7	Test the signal circuit of the TFT sensor for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml"	-		

	extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?		Go to **Step 11**	Go to **Step 10**
8	Replace the TFT sensor, this sensor is part of the TFP manual valve position switch. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 11**	-
9	Replace the AT wiring harness assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 11**	-
10	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 11**	-
11	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Verify that the scan tool indicates a TFT Sensor signal voltage greater than 0.2 volts for 10 seconds. 5. Select Specific DTC. 6. Enter DTC P0712. Has the test run and passed?	-	Go to **Step 12**	Go to **Step 2**
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0713

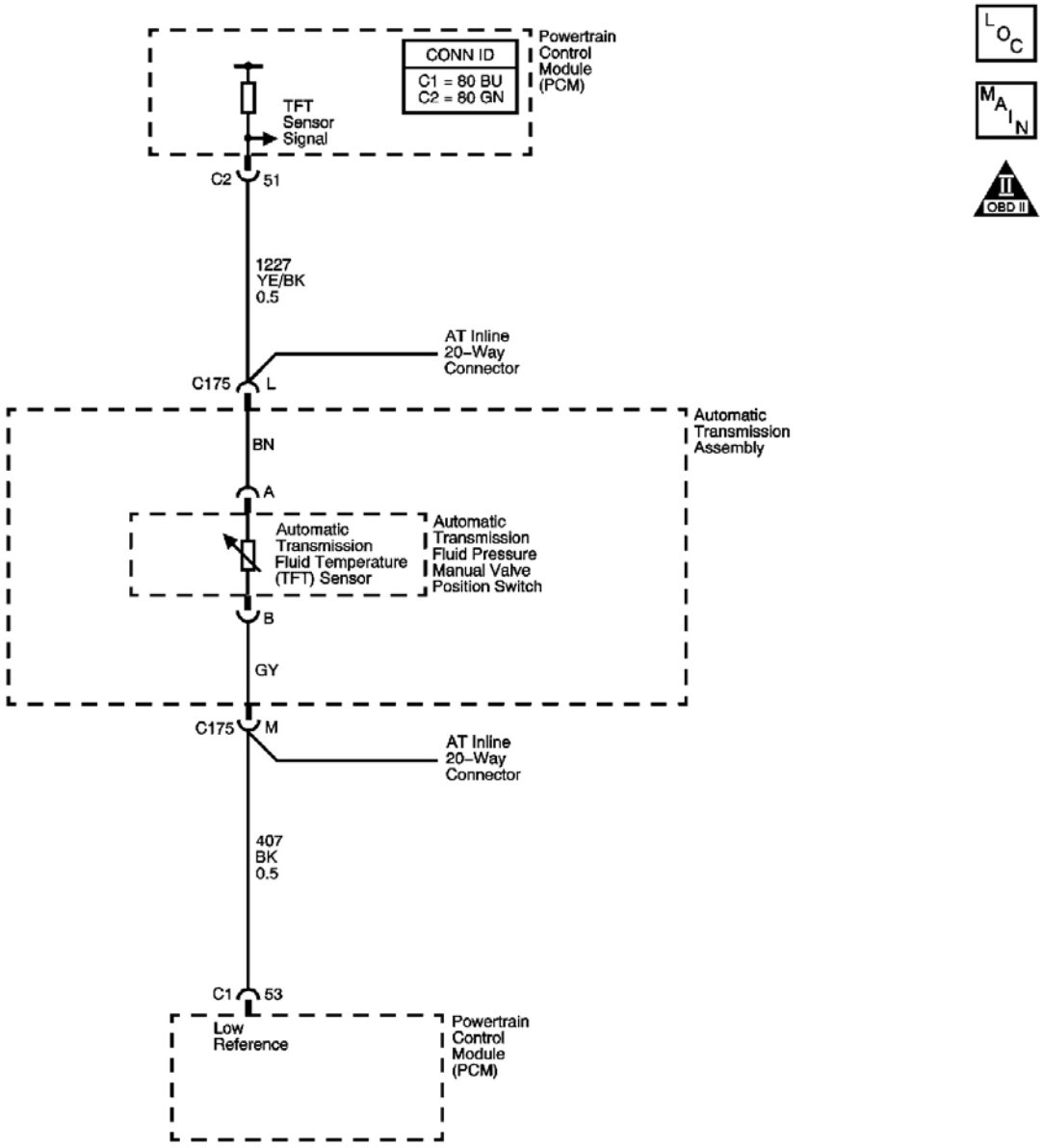

Fig. 7: Automatic Transmission Fluid Temperature (TFT) Sensor
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The automatic transmission fluid temperature (TFT) sensor is part of the automatic transmission fluid pressure (TFP) manual valve position switch. The TFT sensor is a resistor, or thermistor, which changes value based on temperature. The sensor has a negative-temperature coefficient. This means that as the temperature increases, the resistance decreases, and as the temperature decreases, the resistance increases. The powertrain control module (PCM) supplies a 5-volt reference signal to the sensor on the TFT sensor signal circuit and measures the voltage drop in the circuit. When the transmission fluid is cold, the sensor resistance is high and the PCM

detects high signal voltage. As the fluid temperature warms to a normal operating temperature, the resistance becomes less and the signal voltage decreases. The PCM uses this information to control shift quality and torque converter clutch apply.

When the PCM detects a continuous open or short to voltage in the TFT signal circuit or the TFT sensor, then DTC P0713 sets. DTC P0713 is a type C DTC.

Conditions for Running the DTC

The ignition is ON.

Conditions for Setting the DTC

The TFT sensor indicates a signal voltage greater than 4.92 volts for 400 seconds (6.8 minutes).

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).

IMPORTANT: The actions listed below are in order of highest to lowest priority.

- The PCM determines a default TFT using one of the following:
  1. If any ECT DTCs P0117 or P0118 are set, then the default TFT is equal to 135°C (275°F).
  2. If the ECT is 125°C (257°F) or more, then the default TFT is equal to 135°C (275°F).
  3. If the engine run time is less than 300 seconds and:
     - No intake air temperature (IAT) DTCs P0112 or P0113 are set and IAT is available, then the default TFT is equal to IAT.
     - Any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to 90°C (194°F).
  4. If the engine run time is greater than 300 seconds and no IAT DTCs P0112 or P0113 are set and IAT is available and ECT is between 40 and 125°C (104 and 257°F) and:
     - IAT at startup is less than 15°C (59°F), then the default TFT is equal to the ECT plus 5°C (8° F).
     - IAT at startup is greater than 35°C (95°F), then the default TFT is equal to the ECT plus 10° C (16°F).
     - IAT at startup is between 15 and 35°C (59 and 95°F), then the default TFT is equal to the ECT.
  5. If the engine run time is greater than 300 seconds and any IAT DTCs P0112 or P0113 are set or IAT is NOT available, then the default TFT is equal to the ECT.
  6. If the engine run time is greater than 300 seconds and ECT is less than 40°C (104°F) or more, then the default TFT is equal to 60°C (140°F).
- The PCM freezes shift adapts from being updated.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM

stores this information as Failure Records.

- The PCM stores DTC P0713 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

5: This step tests the TFT sensor signal circuit for being shorted to another circuit within the transmission. If the TFT sensor signal circuit shorts to another circuit, which is carrying voltage greater than five volts, the TFT sensor would become open.

6: This step tests the TFT sensor signal circuit for being shorted to voltage, which would be the cause for the open in the TFT sensor.

DTC P0713

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the DTC Failure Records. Using the Clear Info function erases the Failure Records from the PCM.** 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select Trans. Fluid Temp. on the scan tool.	-39°C (-38° F)		

	Does the scan tool display a Trans. Fluid Temp. less than the specified value?		Go to **Step 3**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)
3	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector. Additional DTCs may set. 3. Install the **J 44152** Jumper Harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the DMM and the **J 35616** GM Terminal Test Kit, measure the resistance between terminals L and M of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** .Does the resistance measure less than the specified value?	100 K ohm	Go to **Step 7**	Go to **Step 4**
4	1. Test the signal circuit of the TFT sensor for an open between the AT inline 20-way connector and the TFT sensor. 2. Test the low reference circuit of the TFT sensor for an open between the AT inline 20-way connector and the TFT sensor. Refer to **Testing for Continuity** in Wiring Systems.Did you find an open condition?	-	Go to **Step 8**	Go to **Step 5**
5	Measure the resistance between terminal L and all other terminals of the **J 44152** . Does the resistance measure less than the specified value?	1000 ohm	Go to **Step 10**	Go to **Step 6**
6	Test the signal circuit of the TFT sensor for a short to voltage between the PCM connector and the AT inline 20-way connector. Refer to **Testing for a Short to Voltage** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 9**
	1. Test the signal circuit of the TFT sensor for an open between the PCM connector and the AT inline 20-way connector. 2. Test the low reference circuit of the TFT sensor for an open between the PCM			

	connector and the AT inline 20-way connector. Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct an open condition?	-	Go to **Step 12**	Go to **Step 11**
8	Replace the automatic transmission wiring harness. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 12**	-
9	Replace the TFT sensor. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 12**	-
10	1. Replace the automatic transmission wiring harness. 2. Replace the TFT sensor. Refer to **Valve Body and Pressure Switch Replacement** .Did you complete the replacements?	-	Go to **Step 12**	-
11	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 12**	-
12	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: • Turn ON the ignition, with the engine OFF. • The Trans. Fluid Temp. must be greater than -40°C (-40°F) for 6 seconds. 4. Select Specific DTC. 5. Enter DTC P0713.	-		

	Has the test run and passed?		Go to **Step 13**	Go to **Step 2**
13	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0719

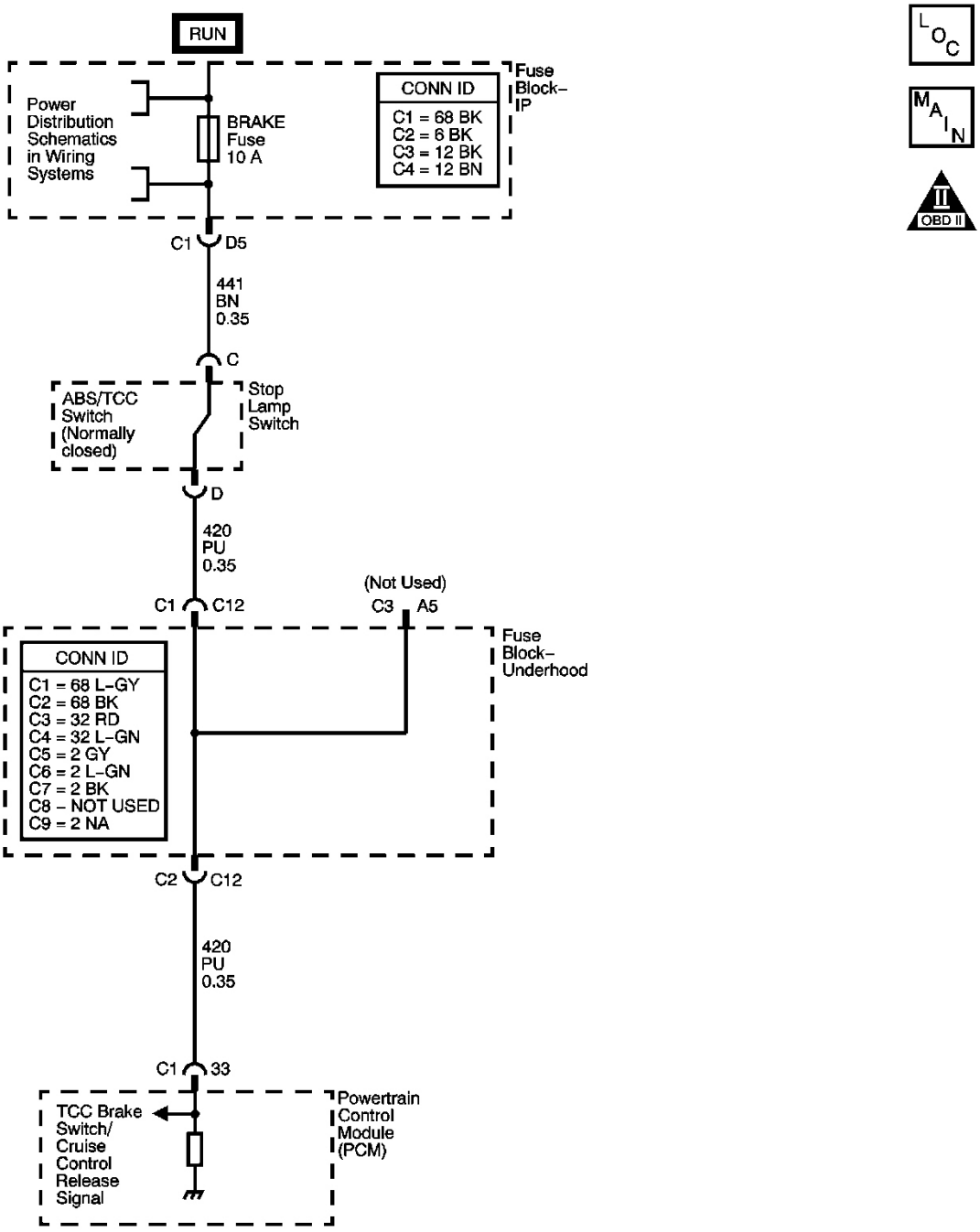

Fig. 8: Brake Switch Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The brake switch indicates brake pedal status to the powertrain control module (PCM). The brake switch is a

normally-closed switch that supplies battery voltage on the TCC brake switch signal circuit to the PCM. Applying the brake pedal opens the switch, interrupting voltage to the PCM. When the brake pedal is released, the PCM receives a constant voltage signal. If the PCM receives a zero voltage signal at the brake switch input, and the torque converter clutch (TCC) is engaged, the PCM de-energizes the TCC solenoid valve. The PCM disregards the brake switch input for TCC scheduling if there is a brake switch circuit fault.

When the PCM detects an open brake switch circuit, 0 volts, low input, during accelerations, then DTC P0719 sets. DTC P0719 is a type C DTC.

Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The ignition is ON.
- DTC P0719 has not passed.

Conditions for Setting the DTC

The PCM detects an open brake switch or circuit, 0 volts, for 15 minutes without changing for 2 seconds, and the following events occur eight times:

- The vehicle speed is less than 8 km/h (5 mph);
- then the vehicle speed is 8-32 km/h (5-20 mph) for 4 seconds;
- then the vehicle speed is greater than 32 km/h (20 mph) for 6 seconds.

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM disregards the brake switch input for TCC scheduling.
- The PCM uses throttle position and vehicle speed to determine application and release of the TCC.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0719 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the brake switch for proper mounting and operation.

- Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0719.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step isolates the brake switch as a source for setting the DTC.

DTC P0719

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM.** 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select TCC Brake Switch on the scan tool. **CAUTION:** **Refer to SIR Caution in Cautions and Notices.** 6. Disconnect the brake switch connector from the brake switch. 7. Connect a test lamp from terminal C of the brake switch connector to ground. Does the test lamp illuminate?	-	Go to **Step 3**	Go to **Step 4**
3	Connect a fused jumper wire between terminal C and terminal D of the brake switch connector. Did the TCC Brake Switch status on the scan tool change from Open to Closed?	-	Go to **Step 7**	Go to **Step 9**
	Inspect the brake fuse for an open.			

4	Refer to **Circuit Protection - Fuses** in Wiring Systems. Is the fuse open?	-	Go to **Step 5**	Go to **Step 8**
5	Test the ignition 3 voltage circuit of the brake switch for a short to ground. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 6**
6	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the signal circuit of the brake switch for a short to ground.Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 10**
7	Replace the brake switch. Refer to **Stop Lamp Switch Replacement** in Lighting Systems. Did you complete the replacement?	-	Go to **Step 11**	-
8	Test the ignition 3 voltage circuit of the brake switch for an open. Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 11**	-
9	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the signal circuit of the brake switch for an open.Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 11**	Go to **Step 10**
10	Replace the PCM. Refer to **Powertrain Control Module (PCM)**	-		-

	Replacement in Engine Controls - 6.0L (LQ4). Did you complete the replacement?		Go to **Step 11**	
11	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Apply and release the brake pedal. 5. Verify that the scan tool TCC Brake Switch status indicates Closed, 12 volts, for 2 seconds. 6. Select Specific DTC. 7. Enter DTC P0719. Has the test run and passed?	-	Go to **Step 12**	Go to **Step 2**
12	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0724

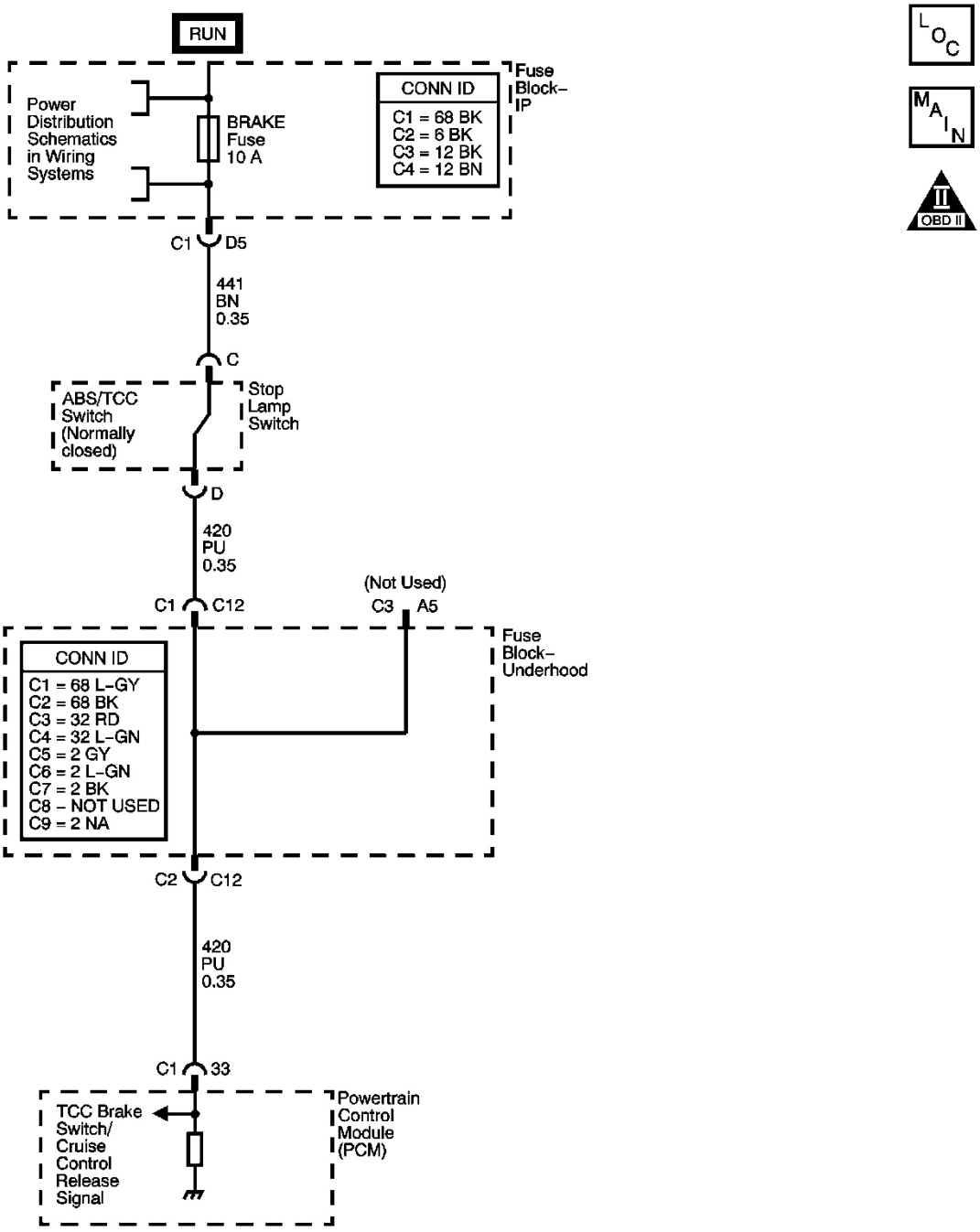

Fig. 9: Brake Switch Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The brake switch indicates brake pedal status to the powertrain control module (PCM). The brake switch is a

normally-closed switch that supplies battery voltage on the TCC brake switch signal circuit to the PCM. Applying the brake pedal opens the switch, interrupting voltage to the PCM. When the brake pedal is released, the PCM receives a constant voltage signal. If the PCM receives a zero voltage signal at the brake switch input, and the torque converter clutch (TCC) is engaged, the PCM de-energizes the TCC solenoid valve. The PCM disregards the brake switch input for TCC scheduling if there is a brake switch circuit fault.

When the PCM detects a closed brake switch circuit, 12 volts, high input, during decelerations, then DTC P0724 sets. DTC P0724 is a type C DTC.

Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The ignition is ON.
- DTC P0724 has not passed.

Conditions for Setting the DTC

The PCM detects a closed brake switch circuit, 12 volts, without changing for 2 seconds and the following events occur eight times:

- The vehicle speed is greater than 32 km/h (20 mph) for 6 seconds;
- then the vehicle speed is between 8-32 km/h (5-20 mph) for 4 seconds;
- then the vehicle speed is less than 8 km/h (5 mph).

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0724 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Inspect the brake switch for proper mounting and operation.
- Inspect for ABS DTCs. A faulty ABS condition may contribute to setting DTC P0724.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step isolates the brake switch as a source for setting the DTC.

DTC P0724

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM.** 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Select TCC Brake Switch on the scan tool. **CAUTION:** **Refer to SIR Caution in Cautions and Notices.** 6. Disconnect the brake switch connector from the brake switch. Did the TCC Brake Switch status change from Closed to Open?	-	Go to **Step 3**	Go to **Step 4**
3	Replace the brake switch. Refer to **Stop Lamp Switch Replacement** in Lighting Systems. Did you complete the replacement?	-	Go to **Step 6**	-
4	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the signal circuit of the brake switch for a short	-		

	to power.Refer to **Testing for a Short to Voltage** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?		Go to **Step 6**	Go to **Step 5**
5	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 6**	-
6	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Turn ON the ignition, with the engine OFF. 4. Apply and release the brake pedal. 5. Verify that the scan tool TCC Brake Switch status indicates Open, 0 volts, for 2 seconds. 6. Select Specific DTC. 7. Enter DTC P0724. Has the test run and passed?	-	Go to **Step 7**	Go to **Step 2**
7	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0740

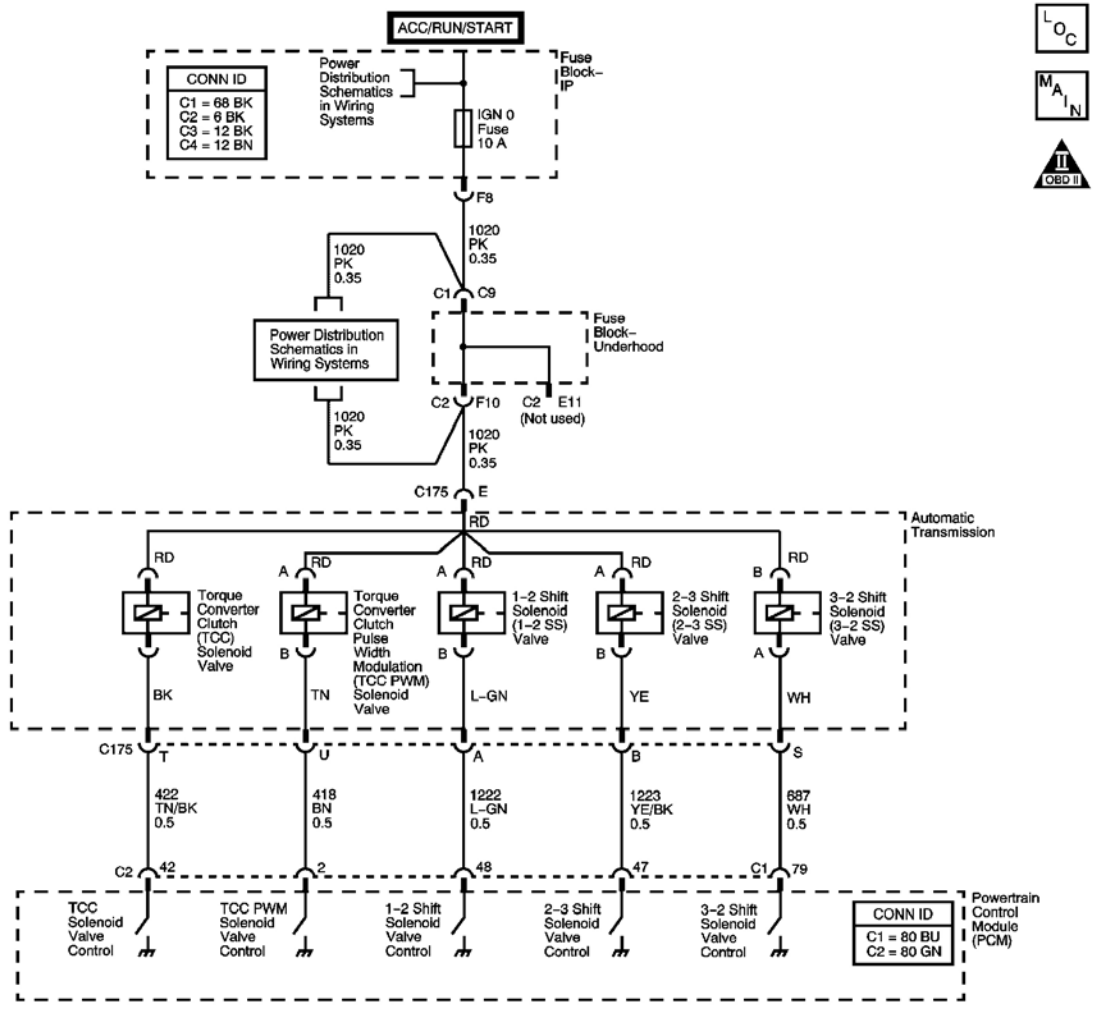

Fig. 10: Torque Converter Clutch (TCC) Solenoid Valve Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The torque converter clutch (TCC) solenoid valve is an electrical device that is used with the torque converter clutch pulse width modulation (TCC PWM) solenoid valve in order to control TCC apply and release. The TCC solenoid valve attaches to the transmission case assembly extending into the pump cover. The TCC solenoid valve receives ignition voltage through the Ignition 0 voltage circuit. The powertrain control module (PCM) controls the solenoid by providing the ground path on the TCC solenoid valve control circuit. The PCM monitors the throttle position sensor voltage, the vehicle speed, and other inputs in order to determine when to energize the TCC solenoid valve.

When the PCM detects a continuous open, short to ground or short to power in the TCC solenoid valve circuit, then DTC P0740 sets. DTC P0740 is a type B DTC.

Conditions for Running the DTC

- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0740 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high, B+.

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low, 0 volt.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0740 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

With the TCC engaged, the TCC slip speed should be -20 to +50 RPM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4: This step tests for voltage to the solenoid.

5: This step tests the ability of the PCM and wiring to control the ground circuit.

7: This step tests the resistance of the TCC solenoid valve and the automatic transmission (AT) wiring harness assembly.

DTC P0740

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0753 • P0758 • P0785 • P2761	-	Go to **Step 3**	Go to **Step 4**
3	Inspect the IGN 0 fuse for an open. Refer to **Circuit Protection - Fuses** in Wiring Systems. Is the fuse open?	-	Go to **Step 9**	Go to **Step 4**
	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector, additional DTCs may set. 3. Install the **J 44152** Jumper Harness (20 pins) on the engine side of the AT inline 20-way			

4	connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the **J 35616** GM Terminal Test Kit, connect a test lamp from terminal E of the **J 44152** to ground. Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the test lamp illuminate?	-	Go to **Step 5**	Go to **Step 12**
5	1. Connect the test lamp from terminal E to terminal T of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . 2. Use the scan tool in order to command the TCC solenoid valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	-	Go to **Step 7**	Go to **Step 6**
6	Is the test lamp always ON?	-	Go to **Step 13**	Go to **Step 14**
7	1. Install the **J 44152** on the transmission side of the AT inline 20-way connector. 2. Using the DMM and the **J 35616** , measure the resistance between terminals T and E of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the resistance measure within the specified range?	21-33 ohm	Go to **Step 8**	Go to **Step 15**
8	1. Measure the resistance from terminal E of the **J 44152** to ground. 2. Measure the resistance from terminal T of the **J 44152** to ground. Do both readings measure greater than the specified value?	250 K ohm	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 15**
	IMPORTANT: **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems**			

	for complete circuit distribution. Test the Ignition 0 voltage circuit of the TCC solenoid valve for a short to ground between the fuse block and the AT inline 20-way connector.Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 10**
10	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 1 voltage circuit of the TCC solenoid valve for a short to ground between the AT inline 20-way connector and the TCC solenoid valve.Refer to **Testing for Short to Ground** in Wiring Systems.Did you find a short to ground condition?	-	Go to **Step 15**	Go to **Step 11**
11	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	-	Go to **Step 17**	-
12	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 0 voltage circuit of the TCC solenoid valve for an open.Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 17**	-
13	Test the control circuit of the TCC solenoid valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 16**
	Test the control circuit of the TCC solenoid valve for			

14	an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 17**	Go to **Step 16**
15	Replace the AT wiring harness assembly, this includes the TCC solenoid valve. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 17**	-
16	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 17**	-
17	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 with the TCC ON and OFF. Ensure that the following conditions are met: • The PCM commands the TCC solenoid valve ON, and the voltage feedback drops to zero. • The PCM commands the TCC solenoid valve OFF, and the voltage feedback increases to B+. • All conditions met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0740. Has the test run and passed?	-	Go to **Step 18**	Go to **Step 2**
18	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0741

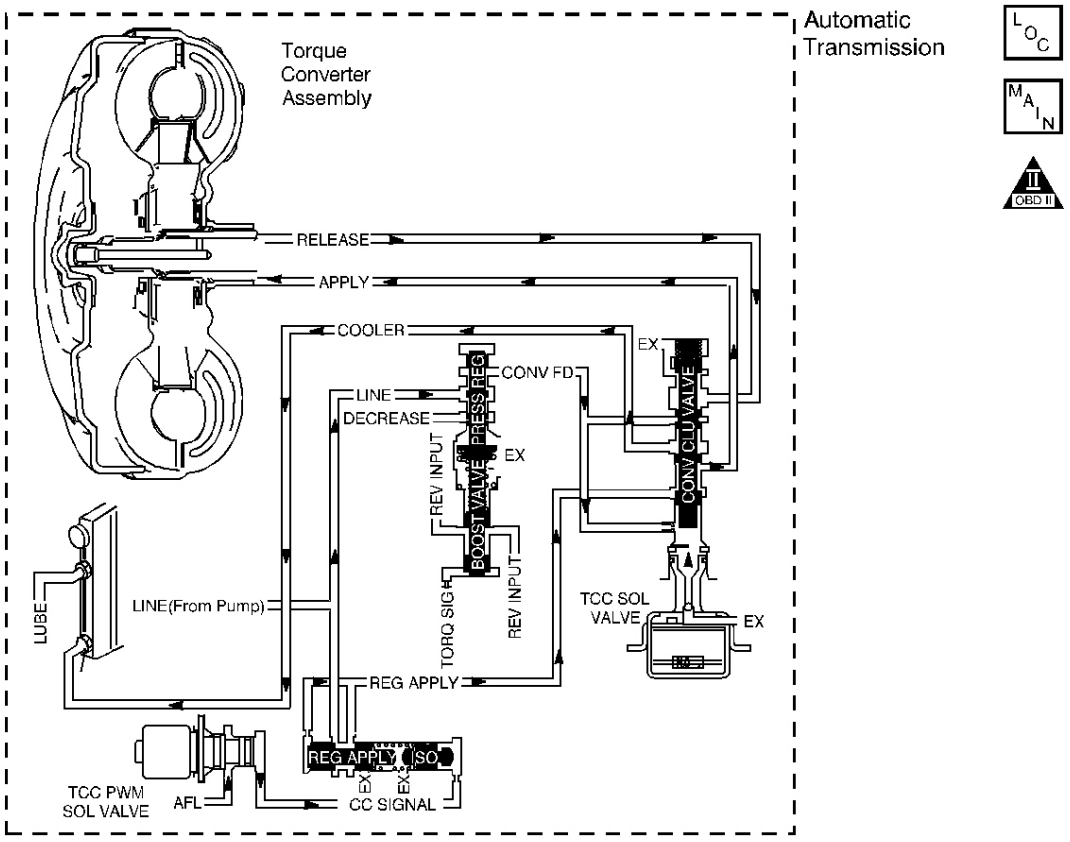

Fig. 11: Torque Converter Clutch (TCC) Fluid Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The torque converter clutch (TCC) solenoid valve is a normally-open exhaust valve that is used with the torque converter clutch pulse width modulation (TCC PWM) solenoid in order to control fluid acting on the converter clutch apply valve. The TCC solenoid valve attaches to the transmission case assembly extending into the pump cover. When grounded, energized, by the powertrain control module (PCM), the TCC solenoid valve stops converter signal oil from exhausting. This causes converter signal oil pressure to increase and move the converter clutch apply valve against spring force and into the apply position. In this position, release fluid is open to an exhaust port and converter feed fluid fills the apply circuit. The converter feed fluid applies the TCC. When the PCM no longer provides a ground path, the TCC solenoid valve de-energizes and apply fluid exhausts, releasing the TCC.

When the PCM detects a high TCC slip speed when the PCM commands the TCC ON, then DTC P0741 sets. DTC P0741 is a type B DTC.

Conditions for Running the DTC

- No TCC DTC P0742.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TFP manual valve position switch DTC P1810.
- No TPS high or low DTCs P1120 or P1220.
- The transmission fluid temperature is 20-150°C (68-302°F).
- The TP angle is 20-99 percent.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The speed ratio is 0.89-1.02, the speed ratio is engine speed divided by output speed.
- The gear range is D2, D3 or D4.
- The gear range does not change within 6 seconds.
- The TCC is commanded ON for 5 seconds.
- The TCC duty cycle is 75 percent or greater.

Conditions for Setting the DTC

DTC P0741 sets if the following condition occurs three times.

The TCC slip speed is 130 RPM or greater for 20 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM freezes transmission adapt functions.
- The PCM commands maximum line pressure.
- The PCM inhibits 4th gear in Hot Mode.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0741 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the ignition switch is OFF long enough in order to power

down the PCM.

Diagnostic Aids

- Contamination may cause the TCC apply valve to stick in the valve body.
- There may be internal damage in the torque converter causing the no TCC apply.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step inspects for excessive TCC slip when the TCC is commanded ON.

3: This step inspects for possible causes of no TCC apply.

DTC P0741

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in the D4 drive range in second, third or fourth gear under steady acceleration, with a TP angle at 20-99%. While the scan tool TCC Enable is Yes, does the scan tool display a TCC Slip Speed greater than the specified range?	130 RPM	Go to **Step 3**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)

3	The TCC is hydraulically or mechanically stuck OFF. Inspect for the following conditions: • Inspect the TCC PWM valve for a damaged exhaust orifice. • Inspect for the converter apply valve being stuck in the OFF, release, position. • Inspect for a misaligned or damaged valve body gasket. • Inspect for a restricted apply valve passage. • Inspect the torque converter clutch for being mechanically stuck OFF. Refer to **Symptoms - Automatic Transmission** NO TCC apply. Was the condition found?	-	Go to **Step 4**	-
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 under the following conditions: Hold the throttle at 20-99% and accelerate to 88 km/h (55 mph). Ensure that the scan tool TCC Slip Speed is less than 50 RPM for 5 seconds, with the TCC ON. 4. Select Specific DTC. 5. Enter DTC P0741. Has the test run and passed?	-	Go to **Step 5**	Go to **Step 2**
5	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0742

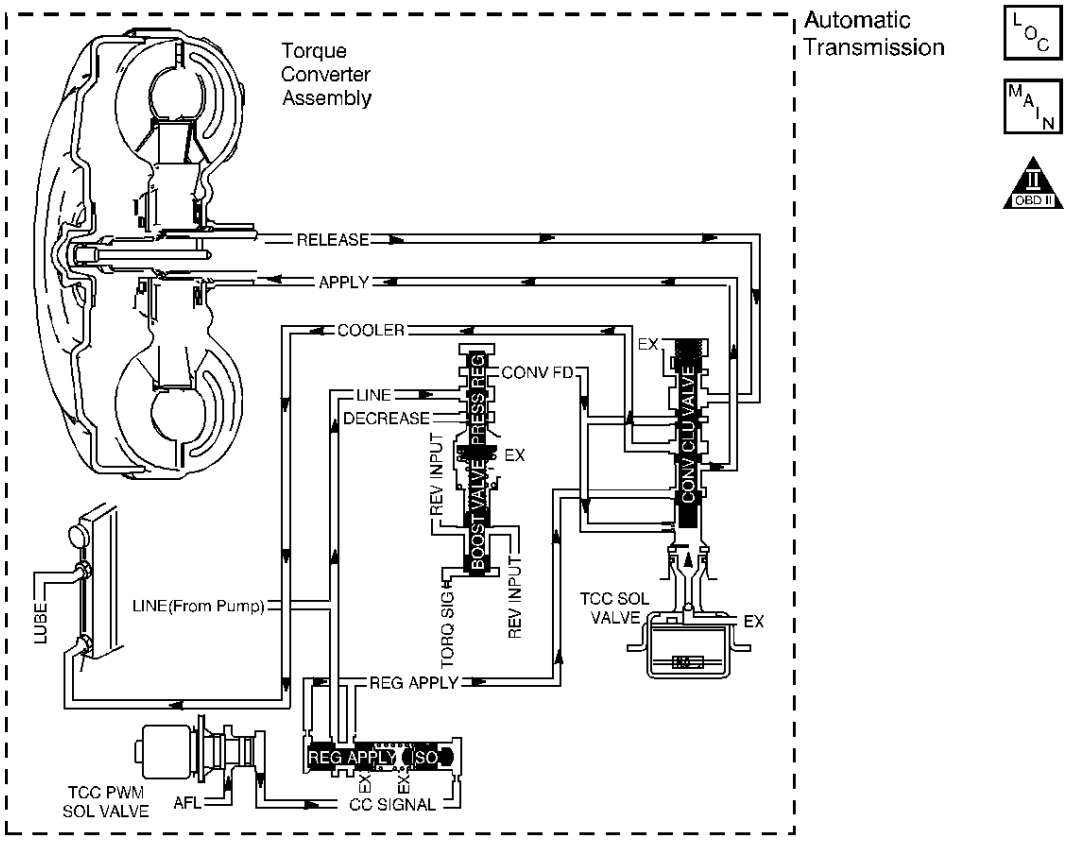

Fig. 12: Torque Converter Clutch (TCC) Fluid Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The torque converter clutch (TCC) solenoid valve is a normally-open exhaust valve that is used with the torque converter clutch pulse width modulation (TCC PWM) solenoid valve in order to control fluid acting on the converter clutch apply valve. The TCC solenoid valve attaches to the transmission case assembly extending into the pump cover. When grounded, energized, by the powertrain control module (PCM), the TCC solenoid valve stops converter signal oil from exhausting. This causes converter signal oil pressure to increase and move the converter clutch apply valve against spring force and into the apply position. In this position, release fluid is open to an exhaust port and converter feed fluid fills the apply fluid circuit. The converter feed fluid applies the TCC. When the PCM no longer provides a ground path, the TCC solenoid valve de-energizes and apply fluid exhausts, releasing the TCC.

When the PCM detects low TCC slip speed when the TCC is commanded OFF, then DTC P0742 sets. DTC P0742 is a type B DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P2761.
- The TP angle is 17-45 percent.
- The engine speed is greater than 450 RPM for 6 seconds.
- The engine is not in fuel cutoff.
- The TFT is between 20-130°C (68-266°F).
- The engine torque is 68-542 N.m (50-400 lb ft).
- The engine speed is 1,000-3,000 RPM.
- The speed ratio is 0.64 to 1.35.
- The vehicle speed is 24-80 km/h (15-50 mph).
- The gear range does not change within 5 seconds.
- The commanded gear is not 1st.
- The gear range is D4.
- The TCC is commanded OFF.

Conditions for Setting the DTC

DTC P0742 sets if the following condition occurs twice.

The TCC slip speed is -20 to +20 RPM for 5 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits 4th gear in Hot Mode.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0742 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.

- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

The TCC fluid hydraulically applies the TCC, possibly causing an engine stall, under the following conditions:

- The TCC is hydraulically stuck ON
- The parking brake is applied
- Any gear range is selected

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step tests the hydraulic state of the TCC. When the PCM commands the TCC solenoid valve OFF, the slip speed should increase.

DTC P0742

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in the D4 drive range in second, third or fourth gear under	-20 to +20 RPM		

	steady acceleration, with a TP angle at 20%. While the scan tool TCC Enable status is NO, does the scan tool display a TCC Slip Speed within the specified range?		Go to **Step 3**	Go to Diagnostic Aids
3	The TCC is hydraulically stuck ON. Inspect for the following: • Clogged exhaust orifice in the TCC solenoid valve. • Converter clutch apply valve stuck in the apply position. • Misaligned or damaged valve body gasket. • Restricted release passage. • Restricted transmission cooler line. Did you find and correct the condition?	-	Go to **Step 4**	-
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 with the TCC OFF and the throttle above 17%. Ensure that the scan tool TCC Slip Speed is 100-2,000 RPM for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0742. Has the test run and passed?	-	Go to **Step 5**	Go to **Step 2**
5	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0748

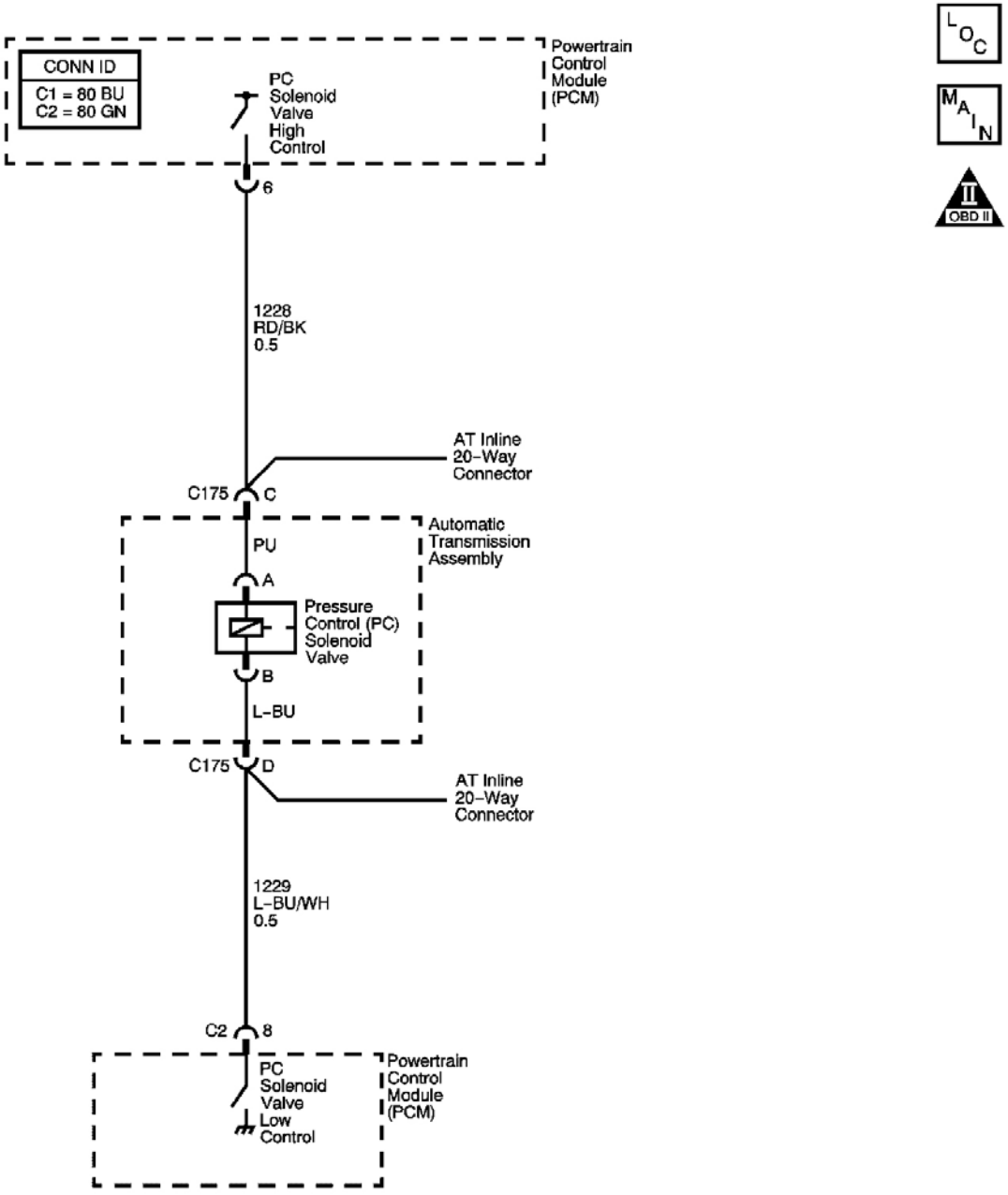

Fig. 13: Pressure Control (PC) Solenoid Valve Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The pressure control (PC) solenoid valve is an electronic device that regulates transmission line pressure based on the current flow through its coil winding. The magnetic field produced by the coil moves the solenoid's internal valve which varies pressure to the pressure regulator valve. The powertrain control module (PCM)

controls the PC solenoid valve by applying a varying amount of amperage to the solenoid. The applied amperage can vary from 0.1 to 1.1 amps. Low amperage, 0.1 amp, indicates high line pressure. High amperage, 1.1 amps, indicates low line pressure. The duty cycle of the PC solenoid valve is expressed as a percentage of energized ON time. Zero percent indicates zero ON time, non-energized, or no current flow. Approximately 60 percent at idle indicates maximum ON time, energized, or high current flow. The PCM determines the appropriate line pressure for a given load by comparing the throttle position sensor voltage, the engine speed and other inputs.

When the PCM detects a continuous open or short in the PC solenoid valve circuit, then DTC P0748 sets. DTC P0748 is a type C DTC.

Conditions for Running the DTC

The engine is running.

Conditions for Setting the DTC

The PC solenoid valve duty cycle reaches its high limit, approximately 95 percent, or low limit, approximately 0 percent.

Action Taken When the DTC Sets

- The PCM does not illuminate the malfunction indicator lamp (MIL).
- The PC solenoid valve is OFF.
- The PCM freezes transmission adaptive functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Failure Records.
- The PCM stores DTC P0748 in PCM history.

Conditions for Clearing the DTC

- A scan tool can clear the DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without a non-emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

DTC P0748 may set under low voltage conditions caused by high electrical system demands.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step tests the ability of the PCM to command the PC solenoid valve.

3: This step tests the PC solenoid valve and automatic transmission wiring harness assembly for incorrect resistance.

DTC P0748

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. With a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Failure Records. Using the Clear Info function erases the Failure Records from the PCM.** 3. Record the DTC Failure Records. 4. Clear the DTC. 5. Start the engine. 6. Use the scan tool in order to command 0.1 amp through 1.0 amp while observing PC Sol. Ref. Current and PC Sol. Actual Current. Is the PC Sol. Actual Current always within the specified value of the PC Sol. Ref. Current?	0.16 amp	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector. 3. Install the **J 44152** Jumper Harness (20 pins) on the transmission side of the AT inline 20-way connector. 4. Using the DMM and the **J 35616** GM Terminal Test Kit, measure the resistance between terminals C and D of the **J 44152** . Refer to **Automatic Transmission**	3-7 ohm		

	Inline 20-Way Connector End View . Does the resistance measure within the specified range?		Go to **Step 5**	Go to **Step 4**
4	Does the resistance measure greater than the specified value?	7 ohm	Go to **Step 9**	Go to **Step 10**
5	Measure the resistance from terminal C of the **J 44152** to the transmission case. Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the resistance measure greater than the specified value?	250 K ohm	Go to **Step 6**	Go to **Step 11**
6	1. Disconnect the **J 44152** from the transmission side of the AT inline 20-way connector. 2. Reconnect the transmission AT inline 20-way connector. 3. Disconnect the PCM connector C2. 4. Measure the resistance between PCM connector terminal C2-6 and terminal C2-8. Does the resistance measure within the specified range?	3-7 ohm	Go to **Step 8**	Go to **Step 7**
7	Does the resistance measure greater than the specified value?	7 ohm	Go to **Step 12**	Go to **Step 13**
8	Using the DMM and the **J 35616** , measure the resistance from PCM connector terminal C2-6 to ground. Does the resistance measure greater than the specified value?	250 K ohm	Go to **Step 17**	Go to **Step 14**
9	Test the high control circuit and the low control circuit of the PC solenoid valve for an open between the AT inline 20-way connector and the PC solenoid valve. Refer to **Testing for Continuity** in Wiring Systems. Did you find an open condition?	-	Go to **Step 16**	Go to **Step 15**
10	Test the high control circuit and the low control circuit of the PC solenoid valve for a shorted together condition between the AT inline 20-way connector and the PC solenoid valve. Refer to **Circuit Testing** in Wiring Systems. Did you find a shorted together condition?	-	Go to **Step 16**	Go to **Step 15**
	Test the high control circuit and the low control			

11	circuit of the PC solenoid valve for a short to ground between the AT inline 20-way connector and the PC solenoid valve. Refer to **Testing for Short to Ground** in Wiring Systems. Did you find a short to ground condition?	-	Go to **Step 16**	Go to **Step 15**
12	Test the high control circuit and the low control circuit of the PC solenoid valve for an open between the PCM connector C2 and the AT inline 20-way connector. Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 19**	-
13	Test the high control circuit and the low control circuit of the PC solenoid valve for a shorted together condition between the PCM connector C2 and the AT inline 20-way connector. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 19**	-
14	Test the high control circuit and the low control circuit of the PC solenoid valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 19**	-
15	Replace the PC solenoid valve. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 19**	-
16	Replace the AT wiring harness assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 19**	-
17	Test the high control circuit and the low control circuit of the PC solenoid for a short to voltage. Refer to **Testing for a Short to Voltage** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring	-		

	Repairs in Wiring Systems. Did you find and correct the condition?		Go to **Step 19**	Go to **Step 18**
18	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 19**	-
19	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Start the engine and ensure that the following condition is met: The difference between the scan tool PC Sol. Actual Current and the PC Sol. Ref. Current is less than 0.16 amp. 4. Select Specific DTC. 5. Enter DTC P0748. Has the test run and passed?	-	Go to **Step 20**	Go to **Step 2**
20	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0751

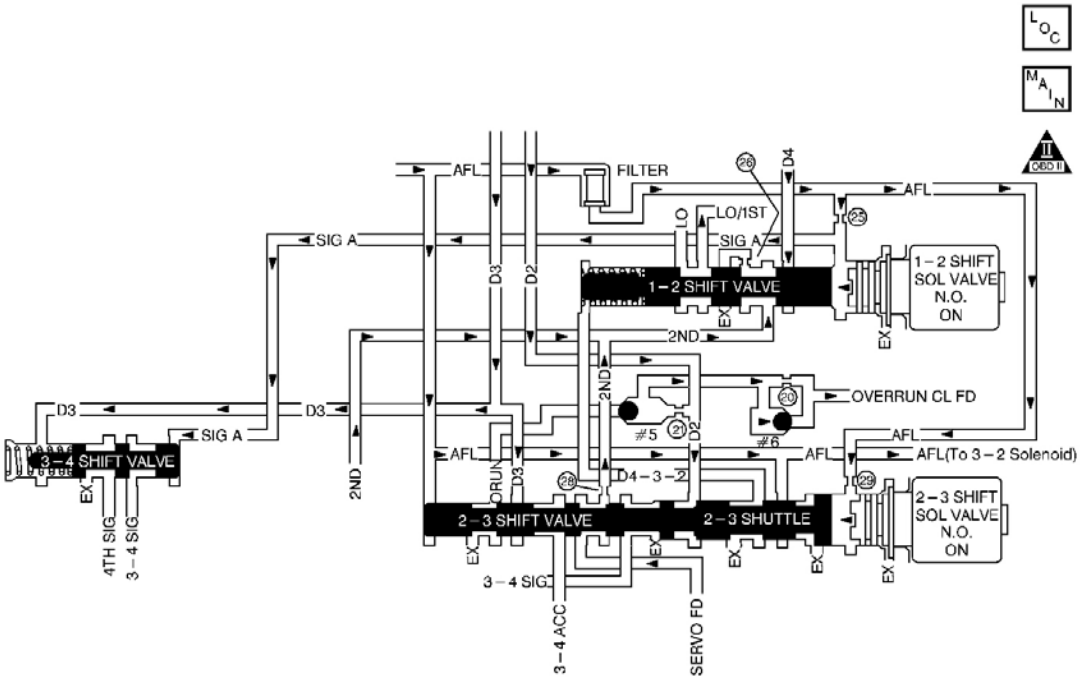

Fig. 14: 1-2 Shift Solenoid (SS) & 2-3 Shift Solenoid (SS) Valve Fluid Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The 1-2 shift solenoid (SS) valve controls the fluid flow acting on the 1-2 and 3-4 shift valves. The 1-2 SS valve is a normally-open exhaust valve that is used with the 2-3 SS valve, in order to allow four different shifting combinations

When the PCM detects a 2-2-3-3 shift pattern, then DTC P0751 sets. DTC P0751 is a type B DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P2761.
- The engine speed is greater than 450 RPM for 5 seconds.

- The engine is not in fuel cutoff.
- The gear range is D4.
- The TP angle is greater than 10 percent.
- The transmission fluid temperature is 20-130°C (68-266°F).
- The engine torque is 68-542 N.m (50-400 lb ft).
- The transmission output speed is 150 RPM or greater.
- The transfer case ratio in 4WD low is 0.9-1.2.
- The transfer case ratio in 4WD high is 2.6-2.85.

Conditions for Setting the DTC

DTC P0751 sets if both of the following conditions occur twice:

Condition 1

- The PCM commands first gear for 2 seconds.
- The estimated gear ratio is 1.2-1.825.
- All conditions are met for 0.5 seconds.

Condition 2

- The PCM commands fourth gear for 1 second.
- The estimated gear ratio is 0.95-1.15.
- All conditions are met for 6 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits the TCC.
- The PCM inhibits 4th gear in Hot Mode.
- The PCM commands D2 line pressure.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0751 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.

- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the **Shift Speed** table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the **Shift Solenoid Valve State and Gear Ratio** table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

DTC P0751

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions: Accelerate the vehicle, ensuring that the	-		

	PCM commands 1st, 2nd, 3rd and 4th gears. Did you detect a 2-2-3-3 shift pattern?		Go to **Step 3**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)
3	Inspect the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction. • Damaged seals on the shift solenoid valve. Refer to **Shift Solenoid Leak Test** . Did you find and correct the condition?	-	Go to **Step 4**	-
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 range under the following condition, only if traffic and road conditions permit: Hold the throttle at 20% and accelerate to 88 km/h (55 mph). 4. Select Specific DTC. 5. Enter DTC P0751. Has the test run and passed?	-	Go to **Step 5**	Go to **Step 2**
5	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0752

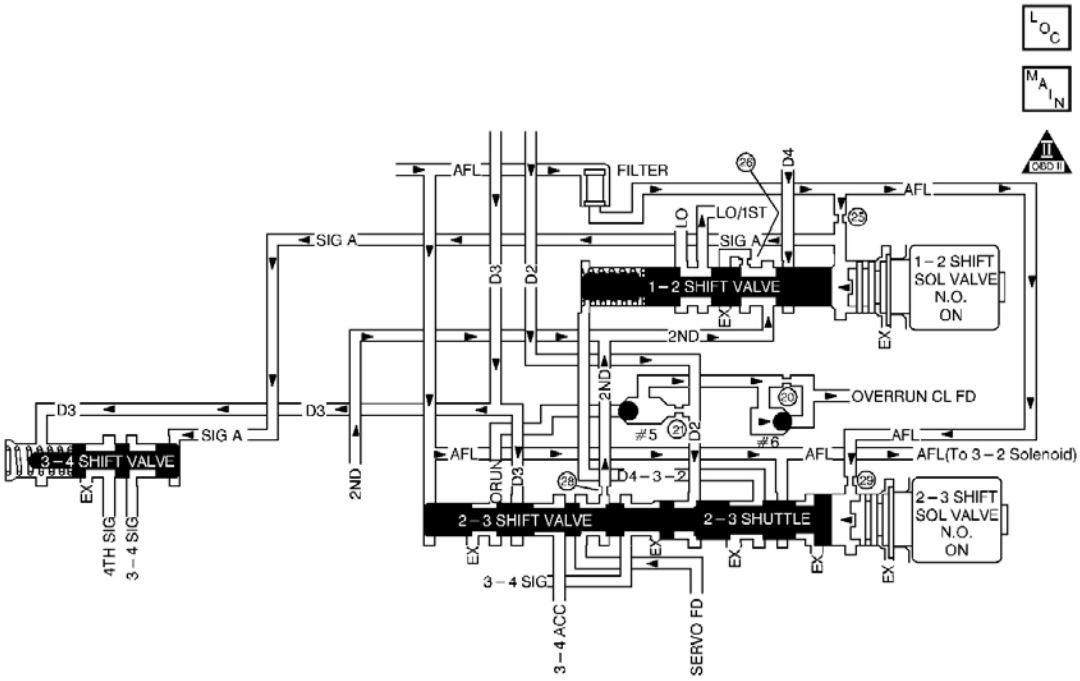

Fig. 15: 1-2 Shift Solenoid (SS) & 2-3 Shift Solenoid (SS) Valve Fluid Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The 1-2 shift solenoid (SS) valve controls the fluid flow acting on the 1-2 and 3-4 shift valves. The 1-2 SS valve is a normally-open exhaust valve that is used with the 2-3 SS valve, in order to allow four different shifting combinations.

When the PCM detects a 1-1-4-4 shift pattern, then DTC P0752 sets. DTC P0752 is a type B DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P2761.
- The engine speed is greater than 450 RPM for 5 seconds.

- The engine is not in fuel cutoff.
- The gear range is D4.
- The TP angle is greater than 10 percent.
- The transmission fluid temperature is 20-130°C (68-266°F).
- The transmission output speed is 150 RPM or greater.
- The transfer case ratio in 4WD low is 0.9-1.2.
- The transfer case ratio in 4WD high is 2.6-2.85.

Conditions for Setting the DTC

DTC P0752 sets if both of the following conditions occur twice:

Condition 1

- The PCM commands second gear for 1 second.
- The estimated gear ratio is 3.0-3.3.
- The engine torque is 34-542 N.m (25-400 lb ft).
- All conditions are met for 2 seconds.

Condition 2

- The PCM commands third gear for 1 second.
- The estimated gear ratio is 0.65-0.9.
- The engine torque is 67-542 N.m (50-400 lb ft).
- All conditions are met for 3 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits 4th gear in Hot Mode.
- The PCM commands D2 line pressure.
- The PCM inhibits 3-2 downshifts if the vehicle speed is greater than 48 km/h (30 mph) or greater.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0752 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.

- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the **Shift Speed** table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the **Shift Solenoid Valve State and Gear Ratio** table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

DTC P0752

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions:	-		

	Accelerate the vehicle, ensuring that the PCM commands 1st, 2nd, 3rd and 4th gears. Did you detect a 1-1-4-4 shift pattern?		Go to **Step 3**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)
3	Inspect the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction. • Damaged seals on the shift solenoid valve. Refer to **Shift Solenoid Leak Test** . Did you find and correct the condition?	-	Go to **Step 4**	-
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 range under the following condition, only if traffic and road conditions permit: Hold the throttle at 20% and accelerate to 88 km/h (55 mph). 4. Select Specific DTC. 5. Enter DTC P0752. Has the test run and passed?	-	Go to **Step 5**	Go to **Step 2**
5	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0753

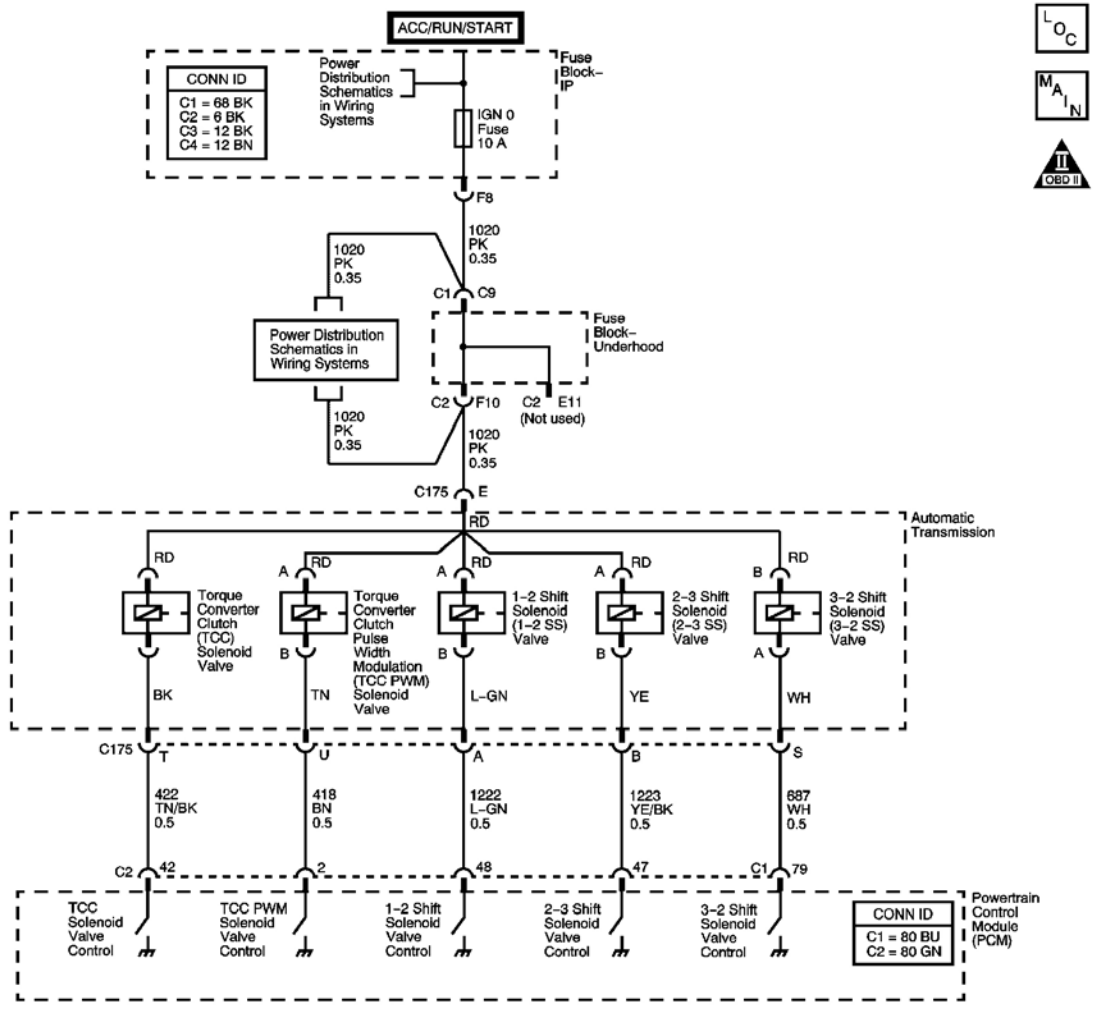

Fig. 16: 1-2 Shift Solenoid (SS) Valve Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The 1-2 shift solenoid (SS) valve controls the fluid flow acting on the 1-2 and 3-4 shift valves. The solenoid is a normally-open exhaust valve. With the 2-3 SS valve, the 1-2 SS valve allows four different shifting combinations. The solenoid attaches to the control valve body within the transmission. The 1-2 SS valve receives ignition voltage through the Ignition 0 voltage circuit. The powertrain control module (PCM) controls the solenoid by providing the ground path on the 1-2 SS valve control circuit.

When the PCM detects a continuous open, short to ground or short to power in the 1-2 SS valve circuit, then DTC P0753 sets. DTC P0753 is a type B DTC.

Conditions for Running the DTC

- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0753 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high, B+.

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low, 0 volts.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands D2 line pressure.
- The PCM inhibits 3-2 downshifts if the vehicle speed is greater than 48 km/h (30 mph).
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear in Hot Mode.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0753 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

Refer to the **Shift Solenoid Valve State and Gear Ratio** table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4: This step tests the function of the 1-2 SS valve and the automatic transmission (AT) wiring harness assembly.

5: This step tests for power to the 1-2 SS valve from the ignition through the fuse.

6: This step tests the ability of the PCM and of the wiring to control the ground circuit.

8: This step measures the resistance of the AT wiring harness assembly and of the 1-2 SS valve.

DTC P0753

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0758 • P0785 • P2761	-	Go to **Step 3**	Go to **Step 4**
3	Inspect the IGN 0 fuse for an open. Refer to **Circuit Protection - Fuses** in Wiring Systems. Is the fuse open?	-	Go to **Step 12**	Go to **Step 5**
4	Use the scan tool in order to command the 1-2 SS valve ON and OFF three times while listening to the bottom of the transmission pan, a stethoscope may be	-	Go to **Intermittent Conditions** in	

	necessary. Does the solenoid click when commanded?		Engine Controls - 6.0L (LQ4)	Go to **Step 5**
5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector, additional DTCs may set. 3. Install the **J 44152** Jumper Harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the **J 35616** GM Terminal Test Kit, connect a test lamp from terminal E of the **J 44152** to ground. Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the test lamp illuminate?	-	Go to **Step 6**	Go to **Step 15**
6	1. Connect a test lamp between terminal E and terminal A of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . 2. Use the scan tool in order to command the 1-2 SS valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	-	Go to **Step 8**	Go to **Step 7**
7	Is the test lamp always ON?	-	Go to **Step 16**	Go to **Step 17**
8	1. Install the **J 44152** on the transmission side of the AT inline 20-way connector. 2. Using the DMM and the **J 35616** , measure the resistance between terminal A and terminal E of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the resistance measure within the specified range?	19-31 ohm	Go to **Step 9**	Go to **Step 10**
9	Measure the resistance from terminal A to ground, and from terminal E to ground. Do both readings measure greater than the specified value?	250 K ohm	Go to **Intermittent Conditions** in Engine Controls -	

			6.0L (LQ4)	Go to **Step 11**
10	1. Disconnect the AT wiring harness assembly from the 1-2 SS valve. 2. Measure the resistance of the 1-2 SS valve. Does the resistance measure within the specified range?	19-31 ohm	Go to **Step 18**	Go to **Step 19**
11	1. Disconnect the AT wiring harness assembly from the 1-2 SS valve. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K ohm	Go to **Step 18**	Go to **Step 19**
12	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 0 voltage circuit of the 1-2 SS valve for a short to ground between the fuse block and the AT inline 20-way connector.Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 13**
13	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 1 voltage circuit of the 1-2 SS valve for a short to ground between the AT inline 20-way connector and the 1-2 SS valve.Refer to **Testing for Short to Ground** in Wiring Systems.Did you find a short to ground condition?	-	Go to **Step 18**	Go to **Step 14**
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	-	Go to **Step 21**	-
	IMPORTANT: **The condition that affects this circuit may exist in**			

	other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.			
15	Test the Ignition 0 voltage circuit of the 1-2 SS valve for an open.Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 21**	-
16	Test the control circuit of the 1-2 SS valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 20**
17	Test the control circuit of the 1-2 SS valve for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 20**
18	Replace the AT wiring harness assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 21**	-
19	Replace the 1-2 SS valve. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 21**	-
20	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 21**	-
	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 and ensure that the following conditions are met: • The PCM commands the 1-2 SS valve			

21	ON and the voltage feedback drops to zero. • The PCM commands the 1-2 SS valve OFF and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0753. Has the test run and passed?	-	Go to **Step 22**	Go to **Step 2**
22	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0756

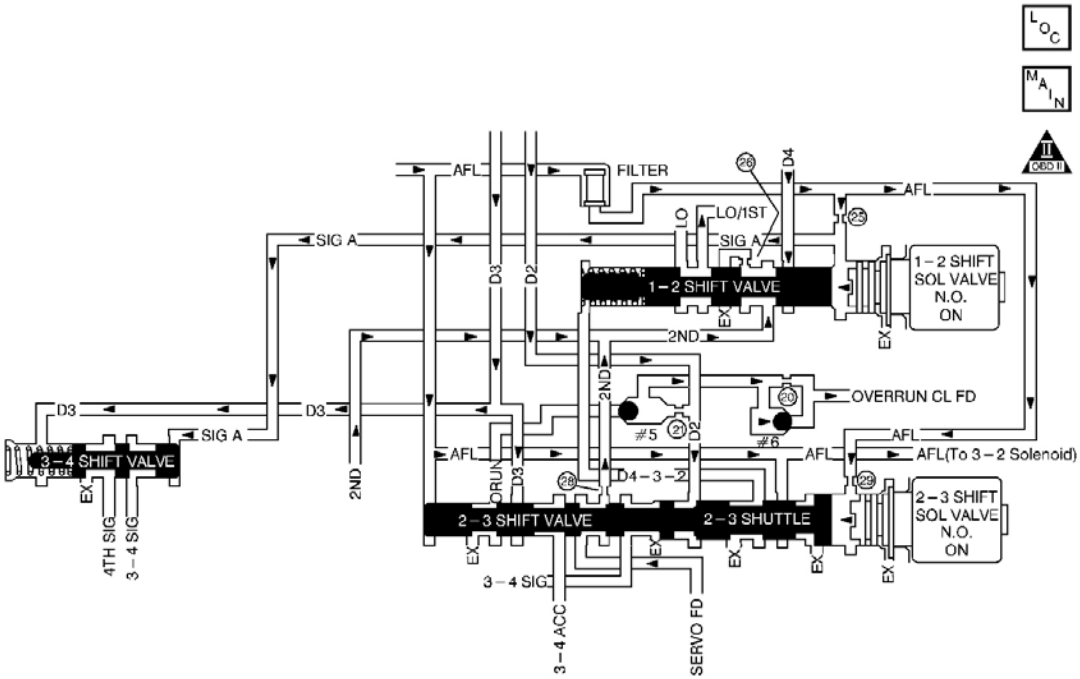

Fig. 17: 1-2 Shift Solenoid (SS) & 2-3 Shift Solenoid (SS) Valve Fluid Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The 2-3 shift solenoid (SS) valve controls the fluid flow acting on the 2-3 shift valves. The 2-3 SS valve is a normally-open exhaust valve that is used with the 1-2 SS valve, in order to allow four different shifting combinations.

When the PCM detects a 4-3-3-4 shift pattern, then DTC P0756 sets. DTC P0756 is a type A DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P2761.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The gear range is D4.
- The TP angle is greater than 10 percent.
- The transmission fluid temperature is 20-130°C (68-266°F).
- The engine torque is 36-295 N.m (50-400 lb ft).
- The transmission output speed is 150 RPM or greater.
- The transfer case ratio in 4WD low is 0.9-1.2.
- The transfer case ratio in 4WD high is 2.6-2.85.

Conditions for Setting the DTC

DTC P0756 sets if both of the following conditions occur:

Condition 1

- The PCM commands first gear for 2 seconds.
- The estimated gear ratio is 0 to 1.4.
- All conditions are met for 1 second.

Condition 2

- The PCM commands second gear for 1 second.
- The estimated gear ratio is 0.9 to 1.2.

- All conditions are met for 2 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands third gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0756 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the **Shift Speed** table.
- Other internal transmission failures may cause more than one shift to occur.
- Refer to the **Shift Solenoid Valve State and Gear Ratio** table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

DTC P0756

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)

2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following conditions: Accelerate the vehicle, ensuring that the PCM commands 1st, 2nd, 3rd and 4th gears. Did you detect a 4-3-3-4 shift pattern?	-	Go to **Step 3**	Go to Diagnostic Aids
3	1. Inspect the shift solenoid/hydraulic circuit for the following conditions: • Debris or chips in the AFL oil passage. • Debris or chips restricting oil flow in passage #29 of the case or through the spacer plate gasket into the valve body. • A cracked 2-3 shift solenoid. • A 2-3 shift valve which is stuck or hung up in the valve body bore. • A 2-3 shuttle valve which is stuck or hung up in its bore. • Damaged seals on the shift solenoid valves. Refer to **Shift Solenoid Leak Test** . 2. Clean and inspect the related valves, bores and the valve body for debris or contamination.	-		-

	Did you find and correct the condition?		Go to **Step 4**	
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 range under the following condition, only if traffic and road conditions permit: Hold the throttle at 40% and accelerate to 64 km/h (40 mph). 4. Select Specific DTC. 5. Enter DTC P0756. Has the test run and passed?	-	Go to **Step 5**	Go to **Step 2**
5	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0757

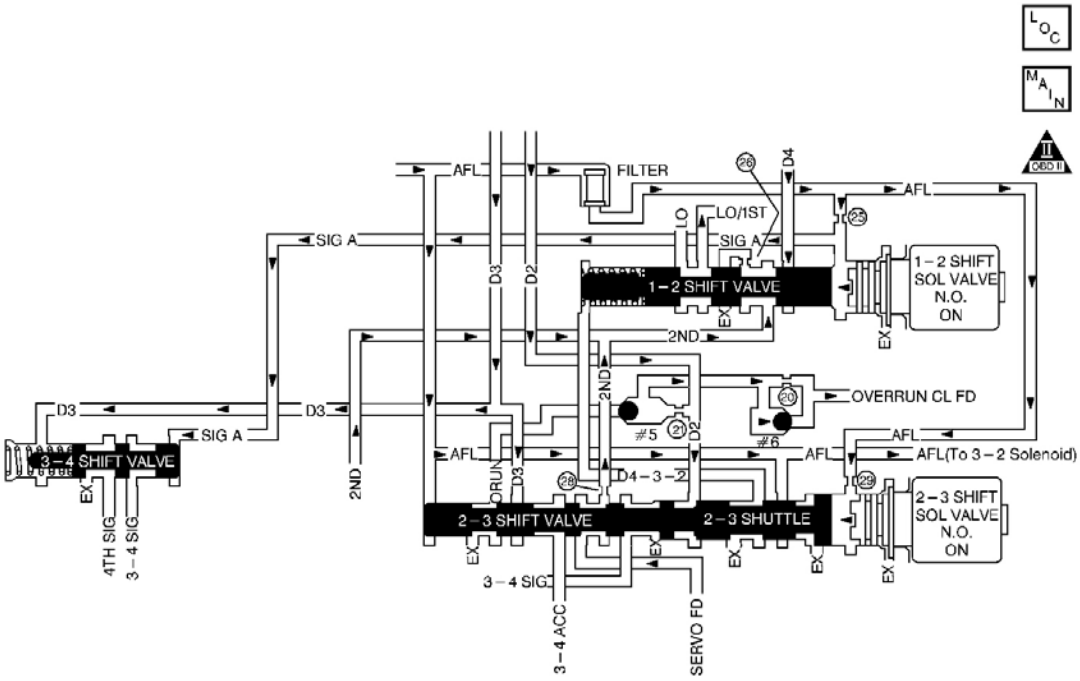

Fig. 18: 1-2 Shift Solenoid (SS) & 2-3 Shift Solenoid (SS) Valve Fluid Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The 2-3 shift solenoid (SS) valve controls the fluid flow acting on the 2-3 shift valves. The 2-3 SS valve is a normally-open exhaust valve that is used with the 1-2 SS valve in order to allow four different shifting combinations.

When the PCM detects a 1-2-2-1 shift pattern, then DTC P0757 sets. DTC P0757 is a type A DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.
- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P2761.
- The engine speed is greater than 450 RPM for 5 seconds.

- The engine is not in fuel cutoff.
- The gear range is D4.
- The TP angle is greater than 10 percent.
- The transmission fluid temperature is 20-130°C (68-266°F).
- The transmission output speed is 150 RPM or greater.
- The transfer case ratio in 4WD low is 0.9-1.2.
- The transfer case ratio in 4WD high is 2.6-2.85.

Conditions for Setting the DTC

DTC P0757 sets if both of the following conditions occur:

Condition 1

- The PCM commands third gear for 1 second.
- The estimated gear ratio is 1.6-1.8.
- The engine torque is 36-368 N.m (50-500 lb ft).
- All conditions are met for 2 seconds.

Condition 2

- The PCM commands fourth gear for 1 second.
- The estimated gear ratio is 1.8-3.3.
- The engine torque is 0-295 N.m (50-400 lb ft).
- All conditions are met for 2 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands third gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0757 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.

- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Verify that the transmission meets the specifications in the **Shift Speed** table.
- Other internal transmission failures may cause more than one shift to occur.

  Refer to the **Shift Solenoid Valve State and Gear Ratio** table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

2: This step tests that the PCM commanded all shifts, that all shift solenoid valves responded correctly, but that all the shifts did not occur.

DTC P0757

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Drive the vehicle in D4 range under the following condition:	-		

	Accelerate the vehicle, ensuring that the PCM commands 1st, 2nd, 3rd and 4th gears. Did you detect a 1-2-2-1 shift pattern?		Go to **Step 3**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)
3	Inspect the shift solenoid/hydraulic circuit for the following conditions: • An internal malfunction • Damaged seals on the shift solenoid valve Refer to **Shift Solenoid Leak Test** . Did you find and correct the condition?	-	Go to **Step 4**	-
4	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 range under the following condition, only if traffic and road conditions permit: Hold the throttle at 15% and accelerate to 80 km/h (55 mph). 4. Select Specific DTC. 5. Enter DTC P0757. Has the test run and passed?	-	Go to **Step 5**	Go to **Step 2**
5	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0758

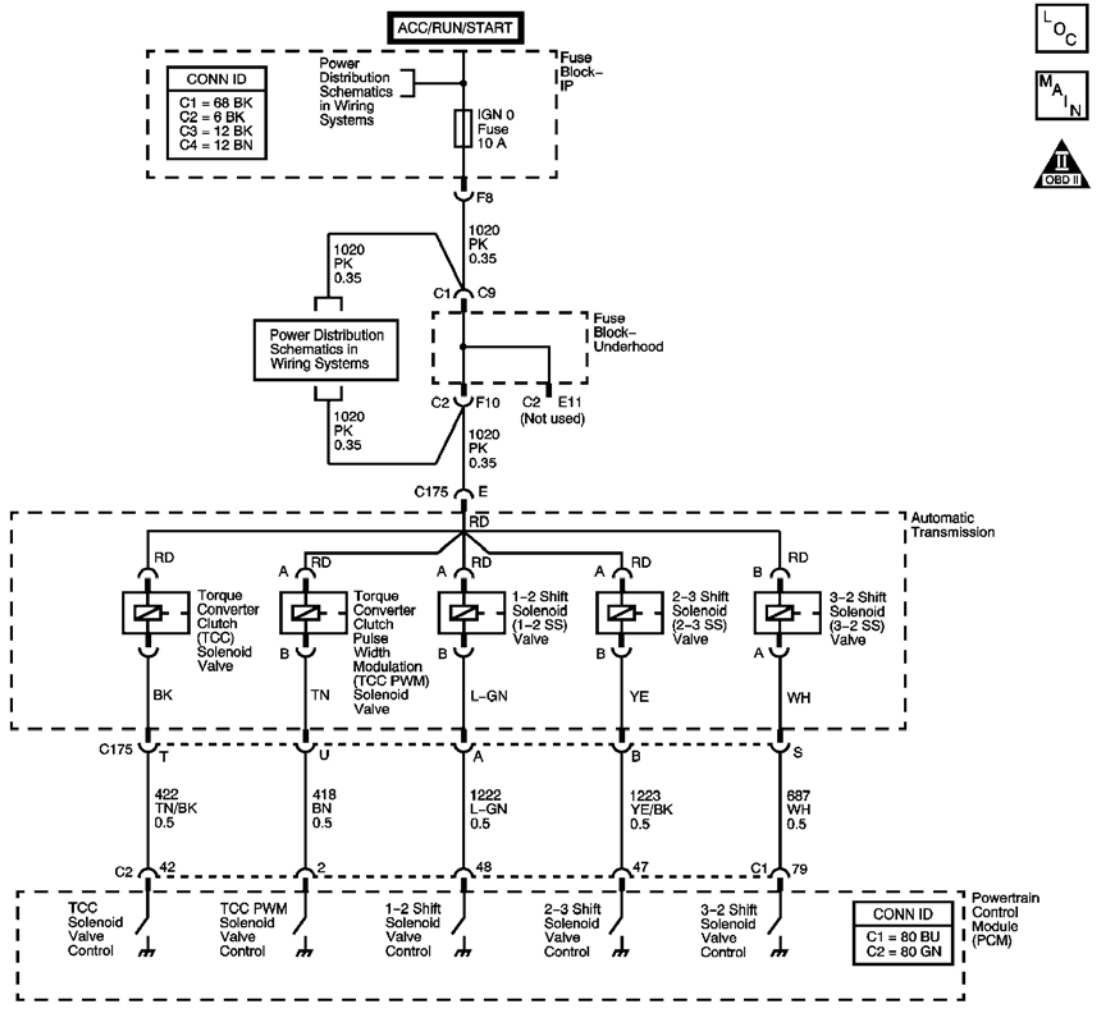

Fig. 19: 2-3 Shift Solenoid (SS) Valve Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The 2-3 shift solenoid (SS) valve controls the fluid flow acting on the 2-3 shift valves. The solenoid is a normally-open exhaust valve. With the 1-2 SS valve, the 2-3 SS valve allows four different shifting combinations. The solenoid attaches to the control valve body within the transmission. The 2-3 SS valve receives ignition voltage through the Ignition 0 voltage circuit. The powertrain control module (PCM) controls the solenoid by providing the ground path on the 2-3 SS valve control circuit.

When the PCM detects a continuous open, short to ground or short to power in the 2-3 SS valve circuit, then DTC P0758 sets. DTC P0758 is a type A DTC.

Conditions for Running the DTC

- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0758 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high, B+.

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low, 0 volts.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL).
- The PCM commands third gear only.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0758 in PCM history.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

Refer to the **Shift Solenoid Valve State and Gear Ratio** table.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4: This step tests the function of the 2-3 SS valve and the automatic transmission (AT) wiring harness

assembly.

5: This step tests for power to the 2-3 SS valve from the ignition through the fuse.

6: This step tests the ability of the PCM and of the wiring to control the ground circuit.

8: This step measures the resistance of the AT wiring harness assembly and of the 2-3 SS valve.

DTC P0758

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0785 • P2761	-	Go to **Step 3**	Go to **Step 4**
3	Inspect the IGN 0 fuse for an open. Refer to **Circuit Protection - Fuses** in Wiring Systems. Is the fuse open?	-	Go to **Step 12**	Go to **Step 5**
4	Use the scan tool in order to command the 2-3 SS valve ON and OFF three times while listening to the bottom of the transmission pan, a stethoscope may be necessary. Does the solenoid click when commanded?	-	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 5**

5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector, additional DTCs may set. 3. Install the **J 44152** Jumper Harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the **J 35616** GM Terminal Test Kit, connect a test lamp from terminal E of the **J 44152** to ground. Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the test lamp illuminate?	-	Go to **Step 6**	Go to **Step 15**
6	1. Connect a test lamp between terminal E and terminal B of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . 2. Use the scan tool in order to command the 2-3 SS valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	-	Go to **Step 8**	Go to **Step 7**
7	Is the test lamp always ON?	-	Go to **Step 16**	Go to **Step 17**
8	1. Install the **J 44152** on the transmission side of the AT inline 20-way connector. 2. Using the DMM and**J 35616** , measure the resistance between terminal B and terminal E of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the resistance measure within the specified range?	19-31 ohm	Go to **Step 9**	Go to **Step 10**
9	Measure the resistance from terminal B to ground, and from terminal E to ground. Do both readings measure greater than the specified value?	250 K ohm	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 11**

10	1. Disconnect the AT wiring harness assembly from the 2-3 SS valve. 2. Measure the resistance of the 2-3 SS valve. Does the resistance measure within the specified range?	19-31 ohm	Go to **Step 18**	Go to **Step 19**
11	1. Disconnect the AT wiring harness assembly from the 2-3 SS valve. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K ohm	Go to **Step 18**	Go to **Step 19**
12	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 0 voltage circuit of the 2-3 SS valve for a short to ground between the fuse block and the AT inline 20-way connector.Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 13**
13	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 1 voltage circuit of the 2-3 SS valve for a short to ground between the AT inline 20-way connector and the 2-3 SS valve.Refer to **Testing for Short to Ground** in Wiring Systems.Did you find a short to ground condition?	-	Go to **Step 18**	Go to **Step 14**
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary. Did you complete the replacement?	-	Go to **Step 21**	-
	IMPORTANT: **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to**			

	Power Distribution Schematics in Wiring Systems for complete circuit distribution.			
15	Test the Ignition 0 voltage circuit of the 2-3 SS valve for an open.Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 21**	-
16	Test the control circuit of the 2-3 SS valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 20**
17	Test the control circuit of the 2-3 SS valve for an open or short to power between the PCM connector C2 and the AT inline 20-way connector. Refer to **Testing for a Short to Voltage** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 20**
18	Replace the AT wiring harness assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 21**	-
19	Replace the 2-3 SS valve. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 21**	-
20	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 21**	-
	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 and ensure the following conditions are met: • The PCM commands the 2-3 SS valve ON and the voltage feedback drops to			

21	zero. • The PCM commands the 2-3 SS valve OFF and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0758. Has the test run and passed?	-	Go to **Step 22**	Go to **Step 2**
22	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0785

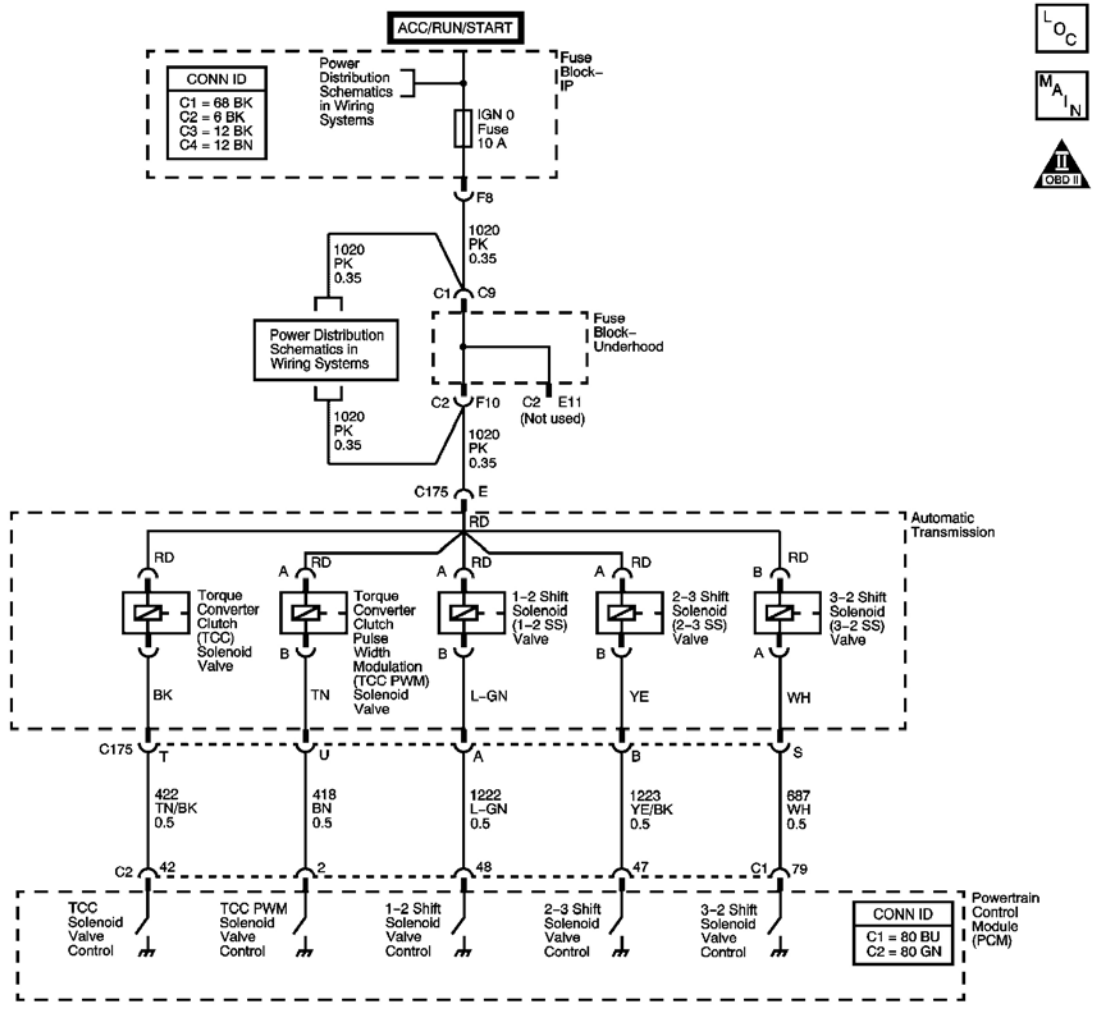

Fig. 20: 3-2 Shift Solenoid (SS) Valve Assembly Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The 3-2 shift solenoid (SS) valve assembly is a normally-closed, 3-port, on/off device that controls the 3-2 downshift. The solenoid attaches to the control valve body within the transmission. The solenoid receives ignition voltage through the Ignition 0 voltage circuit. The powertrain control module (PCM) controls the solenoid by providing a ground path on the 3-2 shift solenoid valve control circuit. During a 3-2 downshift, the 2-4 band applies as the 3-4 clutch releases. The PCM varies the timing between the 3-4 clutch release and the 2-4 band apply, depending on the vehicle speed and the throttle position.

When the PCM detects a continuous open, short to ground or short to power in the 3-2 SS valve assembly circuit, then DTC P0785 sets. DTC P0785 is a type B DTC.

Conditions for Running the DTC

- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.

Conditions for Setting the DTC

DTC P0785 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON and the voltage feedback remains high, B+.

Condition 2

The PCM commands the solenoid OFF and the voltage feedback remains low, 0 volts.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands a soft landing to third gear.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0785 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Test Description

The item numbers below refer to the step numbers on the diagnostic table.

4: This step tests the ability of the PCM to control the solenoid.

5: This step tests for voltage to the solenoid.

6: This step tests the ability of the PCM and the wiring to control the ground circuit.

8: This step measures the resistance of the automatic transmission wiring harness assembly and the 3-2 SS valve assembly.

DTC P0785

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0758 • P2761	-	Go to **Step 3**	Go to **Step 4**
3	Inspect the IGN 0 fuse for an open. Refer to **Circuit Protection - Fuses** in Wiring Systems. Is the fuse open?	-	Go to **Step 12**	Go to **Step 5**
4	Use the scan tool in order to command the 3-2 SS valve assembly ON and OFF three times, while listening to the bottom of the transmission pan, a stethoscope may be necessary. Does the solenoid click when commanded?	-	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 5**

5	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector, additional DTCs may set. 3. Install the **J 44152** Jumper Harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the **J 35616** GM Terminal Test Kit, connect a test lamp from terminal E of the **J 44152** to ground. Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the test lamp illuminate?	-	Go to **Step 6**	Go to **Step 15**
6	1. Connect a test lamp between terminal E and terminal S of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . 2. Use the scan tool in order to command the 3-2 SS valve assembly ON and OFF three times. Does the test lamp turn ON and OFF with each command?	-	Go to **Step 8**	Go to **Step 7**
7	Is the test lamp always ON?	-	Go to **Step 16**	Go to **Step 17**
8	1. Install the **J 44152** on the transmission side of the AT inline 20-way connector. 2. Using the DMM and the **J 35616** , measure the resistance between the terminal E and terminal S of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the resistance measure within the specified range?	20-32 ohm	Go to **Step 9**	Go to **Step 10**
9	1. Measure the resistance from terminal S to ground. 2. Measure the resistance from terminal E to ground.	250 K ohm	Go to **Intermittent Conditions** in	

	Do both readings measure greater than the specified value?		Engine Controls - 6.0L (LQ4)	Go to **Step 11**
10	1. Disconnect the AT wiring harness assembly from the 3-2 SS valve assembly. 2. Measure the resistance of the 3-2 SS valve assembly. Does the resistance measure within the specified range?	20-32 ohm	Go to **Step 18**	Go to **Step 19**
11	1. Disconnect the AT wiring harness assembly from the 3-2 SS valve assembly. 2. Measure the resistance from the component's terminals to ground. Do both readings measure greater than the specified value?	250 K ohm	Go to **Step 18**	Go to **Step 19**
12	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 0 voltage circuit of the 3-2 SS valve assembly for a short to ground between the fuse block and the AT inline 20-way connector.Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 13**
13	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 1 voltage circuit of the 3-2 SS valve assembly for a short to ground between the AT inline 20-way connector and the 3-2 SS valve assembly.Refer to **Testing for Short to Ground** in Wiring Systems.Did you find a short to ground condition?	-	Go to **Step 18**	Go to **Step 14**
14	1. Test each solenoid for a short to ground. 2. Replace the faulty solenoid as necessary.	-		-

	Did you complete the replacement?		Go to **Step 21**	
15	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 0 voltage circuit of the 3-2 SS valve assembly for an open.Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 21**	-
16	Test the control circuit of the 3-2 SS valve assembly for a short to ground between the PCM connector C1 and the AT inline 20-way connector. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 20**
17	Test the control circuit of the 3-2 SS valve assembly for an open or short to voltage between the PCM connector C1 and the AT inline 20-way connector. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 21**	Go to **Step 20**
18	Replace the AT wiring harness assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 21**	-
19	Replace the 3-2 SS valve assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 21**	-
20	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 21**	-
	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info.			

21	3. Drive the vehicle in D3 or D4 and perform a 3-2 downshift. Ensure that the following conditions are met: • The PCM commands the 3-2 SS valve assembly ON, and the voltage feedback drops to zero. • The PCM commands the 3-2 SS valve assembly OFF, and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P0785. Has the test run and passed?	-	Go to **Step 22**	Go to **Step 2**
22	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P0894

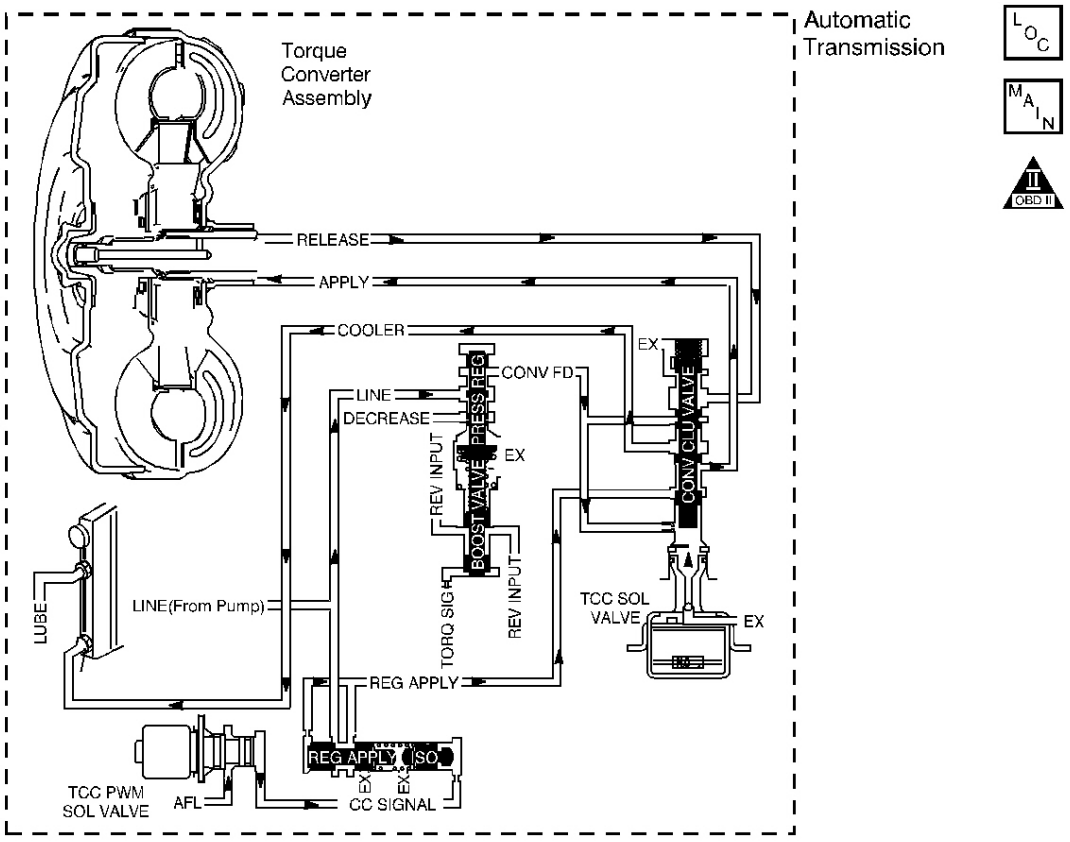

Fig. 21: Torque Converter Clutch (TCC) Fluid Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The powertrain control module (PCM) monitors the difference between engine speed and transmission output speed. In D3 drive range with the TCC engaged, the engine speed should closely match the transmission output speed. In D4 drive range, with the TCC engaged, the TCC slip speed should be -20 to +50 RPM.

When the PCM detects excessive TCC slip when the TCC should be engaged, then DTC P0894 sets. DTC P0894 is a type B DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122 or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No 1-2 SS valve DTC P0753.
- No 2-3 SS valve DTC P0758.

- No 3-2 SS valve assembly DTC P0785.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P2761.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine torque is 68-542 N.m (50-400 lb ft).
- The TP angle is 20-99 percent.
- The vehicle speed is 48-131 km/h (30-82 mph).
- The engine speed is 1,500-3,000 RPM.
- The speed ratio is 0.69-0.88, speed ratio is engine speed divided by the transmission output speed.
- The gear range is D4.
- The commanded gear is not 1st gear.
- The TFT is 20-150°C (68-302°F).
- The shift solenoid performance diagnostic counters are zero.

Conditions for Setting the DTC

DTC P0894 sets if the following conditions occur for three TCC cycles.

- The TCC is commanded ON for 5 seconds.
- The TCC is at 40 percent duty cycle for 5 seconds.
- The TCC slip speed is 130-800 RPM for 7 seconds.

IMPORTANT: The following actions may occur before the DTC sets.

- If the TCC is commanded ON for 5 seconds, the TCC is at 40 percent duty cycle for 5 seconds, the TP angle is 20-99 percent and the transmission slip counter has incremented to either 1 or 2, out of 3 to increment the fail counter for the current ignition cycle, then the following slip conditions and actions may increment the fail counter for the current ignition cycle:

  These conditions must occur sequentially.

Condition 1

If the TCC slip speed is 130-800 RPM for 7 seconds, then the PCM will command maximum line pressure and freeze shift adapts from being updated.

Condition 2

If Condition 1 is met and the TCC slip speed is 130-800 RPM for 7 seconds, then the PCM will command the TCC Off for 1.5 seconds.

Condition 3

If Condition 2 is met and the TCC slip speed is 130-800 RPM for 7 seconds, then the fail counter on the current ignition cycle is incremented.

The above slip conditions and actions may be disregarded if the TCC is commanded OFF at any time as a result of a driving maneuver, sudden acceleration or deceleration.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands maximum line pressure.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P0894 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Bronze material found in the transmission oil pan may indicate stator shaft bushing wear. If bushing wear is suspected, inspect the stator shaft and the input, turbine, shaft for damage.
- Refer to **Symptoms - Automatic Transmission** for more information.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests the torque converter for slippage while in a commanded lock-up state.

DTC P0894

Step	Action	Value (s)	Yes	No

1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	Inspect for correct transmission fluid level. Refer to **Transmission Fluid Checking Procedure** . Did you perform the fluid checking procedure?	-	Go to **Step 3**	Go to **Transmission Fluid Checking Procedure**
3	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. **IMPORTANT:** **It may be necessary to allow multiple TCC cycles to occur in order to verify a slipping condition. It may also be necessary to ensure the transmission is warm before performing this step.** 5. Drive the vehicle in 4th gear with the TCC commanded ON. Does the scan tool TCC Slip Speed measure within the specified range for 7 seconds?	130-800 RPM	Go to **Step 4**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)
	1. Inspect the torque converter clutch (TCC) solenoid valve for the following conditions: • Internal malfunction, such as sediment or damage • Damaged seals Refer to **Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness** .			

4	2. Inspect the torque converter clutch pulse width modulation (TCC PWM) solenoid valve for the following conditions: • Internal malfunction, such as sediment or damage • Damaged seals Refer to **Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid, TCC Solenoid, and Wiring Harness** . Did you find and correct the condition?	-	Go to **Step 14**	Go to **Step 5**
5	1. Inspect the 1-2 shift solenoid (SS) valve for the following conditions: • Internal malfunction, such as sediment or damage • Damaged seals Refer to **Shift Solenoid Leak Test** . 2. Inspect the 2-3 shift solenoid (SS) valve for the following conditions: • Internal malfunction, such as sediment or damage • Damaged seals Refer to **Shift Solenoid Leak Test** . 3. Inspect the 3-2 shift solenoid valve assembly for the following conditions: • Internal malfunction, such as sediment or damage • Damaged seals Refer to **Shift Solenoid Leak Test** . Did you find and correct the condition?	-	Go to **Step 14**	Go to **Step 6**
	Inspect the valve body assembly for the following conditions: • Stuck regulator apply valve • Scored regulator apply valve body			

6	Refer to **Control Valve Body Disassemble** in the 4L60-E section of the Transmission Unit Repair Manual. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 7**
7	Inspect the torque converter assembly for the following conditions: • Front stator shaft bushing for wear • Stator roller clutch not holding • External damage/leaks Refer to **Torque Converter End Play Inspection** . Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 8**
8	Inspect the oil pump assembly for the following conditions: • A stuck converter clutch valve • The converter clutch valve is assembled backwards • A mispositioned converter clutch valve retaining ring • A cocked converter clutch outer valve spring • A mispositioned pump to case gasket • Restricted orifice cup plugs • Damaged orifice cup plugs • Over-tightened, or unevenly tightened pump body to cover bolts Refer to **Oil Pump Cover Disassemble** in the 4L60-E section of the Transmission Unit Repair Manual. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 9**
	Inspect the input housing and shaft assembly for the following conditions: • Cut turbine shaft O-ring seal • Damaged turbine shaft O-ring seal			

9	• Restricted turbine shaft retainer and ball assembly • Damaged turbine shaft retainer and ball assembly Refer to **Input Housing and Shaft Assembly Inspection** in the 4L60-E section of the Transmission Unit Repair Manual. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Step 10**
10	Inspect the 2-4 band assembly for the following conditions: • Worn 2-4 band/ptxt> • Damaged 2-4 band/ptxt> • Mispositioned 2-4 band/ptxt> • Misassembled 2-4 band • The band anchor pin is not engaged Refer to **2-4 Band Assembly Installation** in the 4L60-E section of the Transmission Unit Repair Manual. Inspect the 2-4 servo assembly for the following conditions: • Restricted apply passages in the 2-4 servo assembly • Blocked apply passages in the 2-4 servo assembly • Nicks or burrs on the 2nd apply piston pin • Damaged 2nd apply piston pin • Incorrect 2nd apply piston pin • Nicks or burrs on the pin bore in the case • Damaged fourth servo piston • Misassembled fourth servo piston • Damaged servo bore in the case • Missing piston seals • Cut piston seals • Damaged piston seals • Porosity in the pistons	-		

	• Porosity in the cover • Porosity in the case • Damaged piston seal grooves • Plugged orifice cup plug • Missing orifice cup plug Refer to **2-4 Servo Disassemble** , **2-4 Servo Pin Length Check** and extxref document="029_Transmission-Transaxle-02" filetype="sgml" extrefid="i191431">2-4 Servo Assembly Installation in the 4L60-E section of the Transmission Unit Repair Manual. Did you find and correct the condition?		Go to **Step 13**	Go to **Step 11**
11	Inspect the forward clutch assembly for the following conditions: • Worn clutch plates • Porosity in the forward clutch piston • Damaged forward clutch piston • Missing forward clutch piston inner and outer seals • Cut forward clutch piston inner and outer seals • Damaged forward clutch piston inner and outer seals • Missing input housing to forward clutch housing O-ring seal • Cut input housing to forward clutch housing O-ring seal • Damaged input housing to forward clutch housing O-ring seal • Damaged forward clutch housing • Damaged forward clutch housing retainer and ball assembly • Forward clutch housing retainer and ball assembly is not sealing Refer to **Forward Clutch Assembly Assemble** in the 4L60-E section of the Transmission Unit Repair Manual.	-		

	Did you find and correct the condition?		Go to **Step 13**	Go to **Step 12**
12	Inspect 3-4 clutch assembly for the following conditions: • Worn clutch plates • Porosity in the 3-4 clutch piston • Damaged 3-4 clutch piston • Missing 3-4 clutch inner and outer seals • Cut 3-4 clutch inner and outer seals • Damaged 3-4 clutch inner and outer seals • Damaged 3-4 clutch spring assembly • Damaged 3-4 clutch apply ring • Damaged piston seal grooves • Plugged orifice cup plug • Missing orifice cup plug Refer to **3-4 Clutch Assemble** and extxref document="029_Transmission-Transaxle-02" filetype="sgml" extrefid="i7905">3-4 Clutch Plate Travel Check in the 4L60-E section of the Transmission Unit Repair Manual. Did you find and correct the condition?	-	Go to **Step 13**	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)
13	1. Change the AT fluid and filter. 2. Inspect for correct transmission fluid level. Refer to **Transmission Fluid Checking Procedure** . 3. Add new AT fluid as necessary. **IMPORTANT:** **The Clear TAPS function will clear all adapt cells. This may affect transmission performance. The PCM will update the transmission adapt cell values as the vehicle is driven.** 4. Using the scan tool, perform the Clear TAPS function. Did you complete the above procedure?	-	Go to **Step 14**	-
	Perform the following procedure in order to verify			

14	the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: • Drive the vehicle in D4, with the TCC ON, and a throttle position of 20-99%. • Ensure that the scan tool TCC Slip Speed is -20 to +50 RPM for at least 7 seconds. 4. Select Specific DTC. 5. Enter DTC P0894. Has the test run and passed?	-	Go to **Step 15**	Go to **Step 2**
15	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P1810

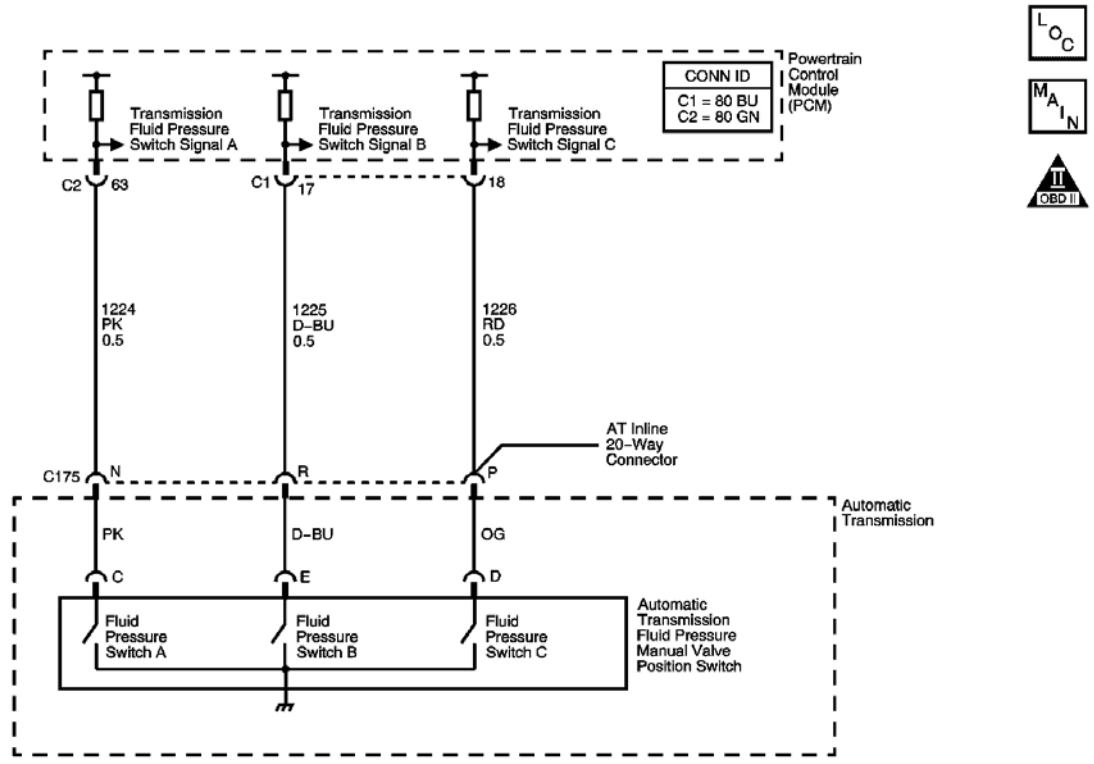

Fig. 22: Automatic Transmission Fluid Pressure (TFP) Manual Valve Position Switch Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The automatic transmission fluid pressure (TFP) manual valve position switch consists of five pressure switches, two normally-closed and three normally-open, and a transmission fluid temperature (TFT) sensor combined into one unit. The combined unit mounts on the valve body. The powertrain control module (PCM) supplies ignition voltage for each range signal. By grounding one or more of these circuits through various combinations of the pressure switches, the PCM detects which manual valve position you select. The PCM compares the actual voltage combination of the switches to a TFP manual valve position switch combination chart stored in memory.

The TFP manual valve position switch cannot distinguish between PARK and NEUTRAL because the monitored valve body pressures are identical. With the engine OFF and the ignition switch in the ON position, the TFP manual valve position switch indicates PARK/NEUTRAL. Disconnecting the AT inline 20-way connector removes the ground potential for the three range signals to the PCM. In this case, with the engine OFF, and the ignition switch in the ON position, D2 will be indicated.

When the PCM detects an invalid state of the TFP manual valve position switch circuit by deciphering the TFP manual valve position switch inputs, then DTC P1810 sets. DTC P1810 is a type B DTC.

Conditions for Running the DTC

- No VSS assembly DTCs P0502 or P0503.
- The system voltage is 10-18 volts.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The engine torque is 54-542 N.m (40-400 lb ft).
- The engine vacuum is 0-105 kPa (0-15 psi).

Conditions for Setting the DTC

DTC P1810 sets if any of the following conditions occurs:

Condition 1

The PCM detects an invalid TFP manual valve position switch state for 60 seconds.

Condition 2

- The engine speed is less than 80 RPM for 0.1 second;

  then the engine speed is 80-550 RPM for 0.07 second;

  then the engine speed is greater than 550 RPM.

- The vehicle speed is less than 3 km/h (2 mph).
- The PCM detects a gear range of D2, D4 or REVERSE during an engine start.
- All conditions met for 5 seconds.

Condition 3

- The TP angle is 10-50 percent.
- The PCM commands fourth gear.
- The TCC is locked ON.
- The speed ratio is 0.6-0.75.
- The PCM detects a gear range of PARK or NEUTRAL when the vehicle is operating in D4.
- All conditions met for 10 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands D2 line pressure.
- The PCM commands a D4 shift pattern.
- The PCM freezes transmission adapt functions.

- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P1810 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Diagnostic Aids

- Refer to the **Transmission Fluid Pressure (TFP) Manual Valve Position Switch Logic** table for the normal range signals and the invalid combinations. On the table, LOW is 0 volts, HI is ignition voltage.
- Sediment in the valve body may cause improper operation of the TFP manual valve position switch. If sediment intrusion is suspected, clean the valve body and replace the TFP manual valve position switch.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step compares the indicated range signal to the selected manual valve position.

5: This step tests for correct voltage from the PCM to the AT inline 20-way connector.

DTC P1810

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	Inspect for correct transmission fluid level. Refer to **Transmission Fluid Checking Procedure** . Did you perform the fluid checking procedure?	-	Go to **Step 3**	Go to **Transmission Fluid Checking Procedure**
	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF.			

3	**IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. 5. Start the engine and idle at normal operating temperature. 6. Apply the brake pedal. 7. Select each transmission range: P, R, N, D4, D3, D2 and D1. Does each selected transmission range match the scan tool TFP Sw. display?	-	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 4**
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector, additional DTCs may set. 3. Turn ON the ignition, with the engine OFF. Does the scan tool TFP Sw. A/B/C parameter indicate HI for all range signal states?	-	Go to **Step 5**	Go to **Step 9**
5	1. Turn OFF the ignition. 2. Install the **J 44152** Jumper Harness (20 pins) on the engine side of the AT inline 20-way connector. 3. Turn ON the ignition, with the engine OFF. 4. Using the DMM and the **J 35616** GM Terminal Test Kit, measure the voltage from terminal N of the **J 44152** to ground. Refer to **Automatic Transmission Inline 20-Way Connector End View** . 5. Measure the voltage from terminal R of the **J 44152** to ground.	10-12 V		

	6. Measure the voltage from terminal P of the **J 44152** to ground. Does the voltage measure within the specified range at all three terminals?		Go to **Step 6**	Go to **Step 10**
6	Connect a fused jumper wire from terminal N of the **J 44152** , signal circuit A, to ground while monitoring the scan tool TFP Sw. A/B/C parameter. When signal circuit A is grounded, do any other signal circuits indicate LOW?	-	Go to **Step 11**	Go to **Step 7**
7	Connect a fused jumper wire from terminal R of the **J 44152** , signal circuit B, to ground while monitoring the scan tool TFP Sw. A/B/C parameter. When signal circuit B is grounded, do any other signal circuits indicate LOW?	-	Go to **Step 11**	Go to **Step 8**
8	Connect a fused jumper wire from terminal P of the **J 44152** , signal circuit C, to ground while monitoring the scan tool TFP Sw. A/B/C parameter. When signal circuit C is grounded, do any other signal circuits indicate LOW?	-	Go to **Step 11**	Go to **Step 12**
9	Test the signal circuits of the TFP manual valve position switch that did not indicate HI for a short to ground between the PCM connector C1 and C2 and the AT inline 20-way connector. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 15**
10	Test the signal circuits of the TFP manual valve position switch that did not indicate ignition voltage for an open between the PCM connector C1 and C2 and the AT inline 20-way connector. Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 15**
	Test the affected signal circuits of the TFP manual valve position switch for a shorted together condition between the PCM connector C1 and C2 and the AT inline 20-way			

11	connector. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 16**	Go to **Step 15**
12	Test the signal circuits of the TFP manual valve position switch for an open or shorted condition between the TFP manual valve position switch and the AT inline 20-way connector. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find a condition?	-	Go to **Step 13**	Go to **Step 14**
13	Replace the AT wiring harness assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 16**	-
14	Replace the TFP manual valve position switch. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 16**	-
15	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 16**	-
16	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: 1. Turn ON the ignition, with the engine OFF for at least 2 seconds. 2. Start the vehicle and idle for 5 seconds. 3. Drive in D4 until the TCC locks for 10 seconds. 4. Continue to run the engine for at least 60 seconds from startup. 4. Select Specific DTC.	-		

	5. Enter DTC P1810. Has the test run and passed?		Go to **Step 17**	Go to **Step 2**
17	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P2761

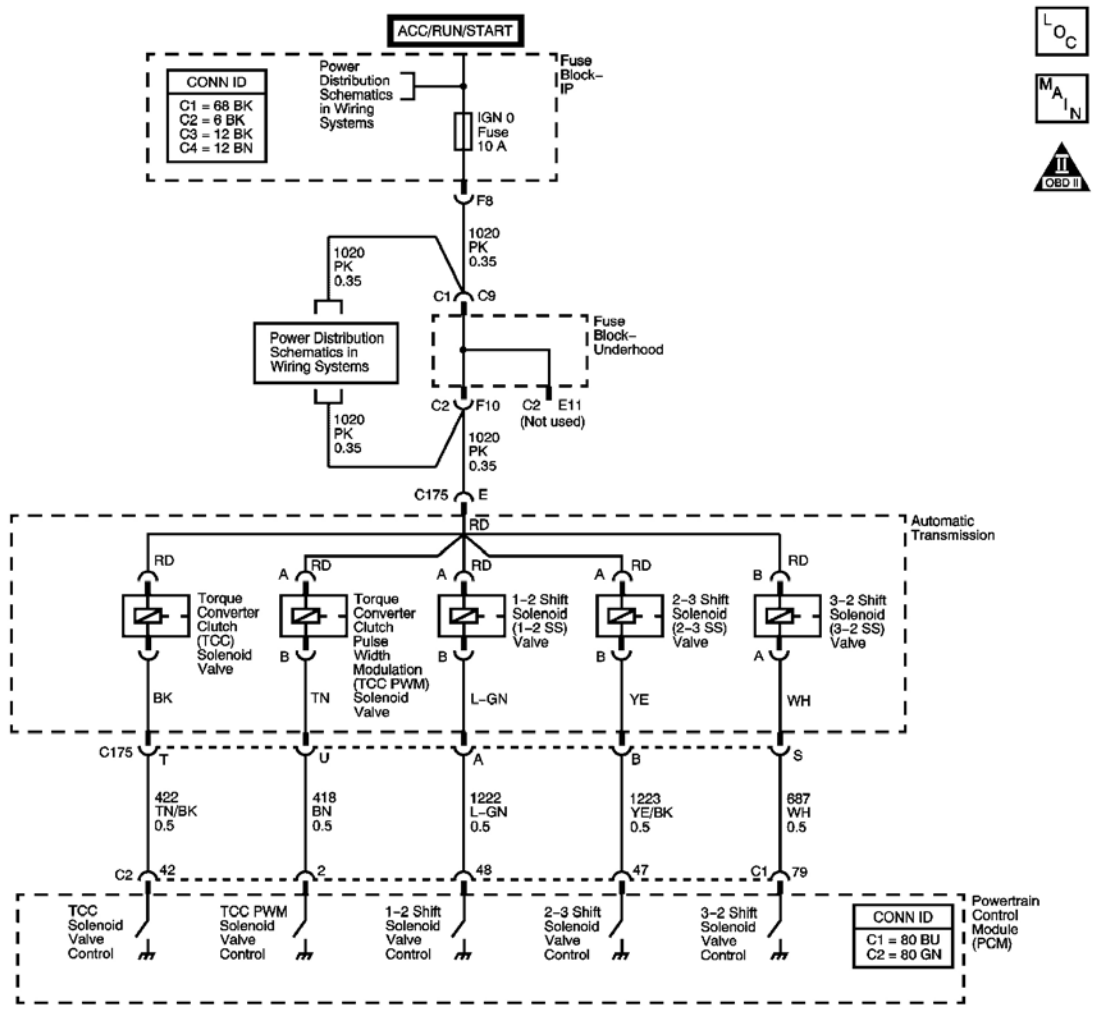

Fig. 23: Torque Converter Clutch Pulse Width Modulation (TCC PWM) Solenoid Valve Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The torque converter clutch pulse width modulation (TCC PWM) solenoid valve controls the fluid acting on the converter clutch valve. The converter clutch valve controls the TCC application and release. The solenoid attaches to the control valve body within the transmission. The solenoid receives ignition voltage through the Ignition 0 voltage circuit. The powertrain control module (PCM) controls the solenoid by providing a ground path on the TCC PWM solenoid valve control circuit. Current flows through the solenoid coil according to the duty cycle, percentage of ON and OFF time. The TCC PWM solenoid valve provides a smooth engagement of the TCC by operating during a duty cycle percent of ON time.

When the PCM detects a continuous open, short to ground or short to power in the TCC PWM solenoid valve circuit, then DTC P2761 sets. DTC P2761 is a type B DTC.

Conditions for Running the DTC

- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The PCM commands first gear.
- The TCC duty cycle is less than 10 percent or greater than 90 percent.

Conditions for Setting the DTC

DTC P2761 sets if one of the following conditions occurs for 5 seconds:

Condition 1

The PCM commands the solenoid ON, 90 percent, and the voltage feedback remains high, B+.

Condition 2

The PCM commands the solenoid OFF, 0 percent, and the voltage feedback remains low, 0 volt.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM inhibits TCC engagement.
- The PCM inhibits 4th gear if the transmission is in hot mode.
- The PCM freezes transmission adapt functions.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P2761 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and

passes.

- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4: This step tests for voltage to the solenoid.

5: This step tests the ability of the PCM and wiring to control the ground circuit.

7: This step tests the resistance of the TCC PWM solenoid valve and the automatic transmission wiring harness assembly.

DTC P2761

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
2	1. Install a scan tool. 2. Turn ON the ignition, with the engine OFF. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure Records. 4. Clear the DTC. Are any of the following DTCs also set? • P0740 • P0753 • P0758	-		

	• P0785		Go to **Step 3**	Go to **Step 4**
3	Inspect the IGN 0 fuse for an open. Refer to **Circuit Protection - Fuses** in Wiring Systems. Is the fuse open?	-	Go to **Step 11**	Go to **Step 4**
4	1. Turn OFF the ignition. 2. Disconnect the AT inline 20-way connector, additional DTCs may set. 3. Install the **J 44152** Jumper Harness (20 pins) on the engine side of the AT inline 20-way connector. 4. Turn ON the ignition, with the engine OFF. 5. Using the **J 35616** GM Terminal Test Kit, connect a test lamp from terminal E of the **J 44152** to ground. Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the test lamp illuminate?	-	Go to **Step 5**	Go to **Step 14**
5	1. Connect the test lamp between terminal E and terminal U of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . 2. Use the scan tool in order to command the TCC PWM solenoid valve ON and OFF three times. Does the test lamp turn ON and OFF with each command?	-	Go to **Step 7**	Go to **Step 6**
6	Is the test lamp always ON?	-	Go to **Step 15**	Go to **Step 16**
7	1. Install the **J 44152** on the transmission side of the AT inline 20-way connector. 2. Using the DMM and the **J 35616** , measure the resistance between terminal E and terminal U of the **J 44152** . Refer to **Automatic Transmission Inline 20-Way Connector End View** . Does the resistance measure within the specified range?	10-15 ohm	Go to **Step 8**	Go to **Step 9**

8	Measure the resistance from terminal E to ground, and from terminal U to ground. Do both readings measure greater than the specified value?	250 K ohm	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 10**
9	1. Disconnect the AT wiring harness assembly from the TCC PWM solenoid valve. 2. Measure the resistance of the TCC PWM solenoid valve. Does the resistance measure within the specified range?	10-15 ohm	Go to **Step 17**	Go to **Step 18**
10	1. Disconnect the AT wiring harness assembly from the TCC PWM solenoid valve. 2. Measure the resistance from each of the component terminals to ground. Do both readings measure greater than the specified value?	250 K ohm	Go to **Step 17**	Go to **Step 18**
11	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 0 voltage circuit of the TCC PWM solenoid valve for a short to ground between the fuse block and the AT inline 20-way connector.Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 20**	Go to **Step 12**
12	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 1 voltage circuit of the TCC PWM solenoid valve for a short to ground between the AT inline 20-way connector and the TCC PWM solenoid valve.Refer to **Testing for Short to Ground** in Wiring Systems.Did you find a short to ground condition?	-	Go to **Step 17**	Go to **Step 13**
	1. Test each solenoid for a short to ground.			

13	2. Replace the faulty solenoid as necessary. Did you complete the replacement?	-	Go to **Step 20**	-
14	**IMPORTANT:** **The condition that affects this circuit may exist in other connecting branches of the circuit. Refer to Power Distribution Schematics in Wiring Systems for complete circuit distribution.** Test the Ignition 0 voltage circuit of the TCC PWM solenoid valve for an open.Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems.Did you find and correct the condition?	-	Go to **Step 20**	-
15	Test the control circuit of the TCC PWM solenoid valve for a short to ground between the PCM connector C2 and the AT inline 20-way connector. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 20**	Go to **Step 19**
16	Test the control circuit of the TCC PWM solenoid valve for an open or short to voltage between the PCM connector C2 and the AT inline 20-way connector. Refer to **Circuit Testing** and extxref document="029_body-21" filetype="sgml" extrefid="i162420"> Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 20**	Go to **Step 19**
17	Replace the AT wiring harness assembly. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 20**	-
18	Replace the TCC PWM solenoid valve. Refer to **Valve Body and Pressure Switch Replacement** . Did you complete the replacement?	-	Go to **Step 20**	-
19	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 20**	-
	Perform the following procedure in order to verify the repair:			

20	1. Select DTC. 2. Select Clear Info. 3. Drive the vehicle in D4 with the TCC On. Ensure that the following conditions are met: • The PCM commands the TCC PWM solenoid valve ON, and the voltage feedback drops to zero. • The PCM commands the TCC PWM solenoid valve OFF, and the voltage feedback increases to B+. • All conditions are met for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P2761. Has the test run and passed?	-	Go to **Step 21**	Go to **Step 2**
21	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK

DTC P2771

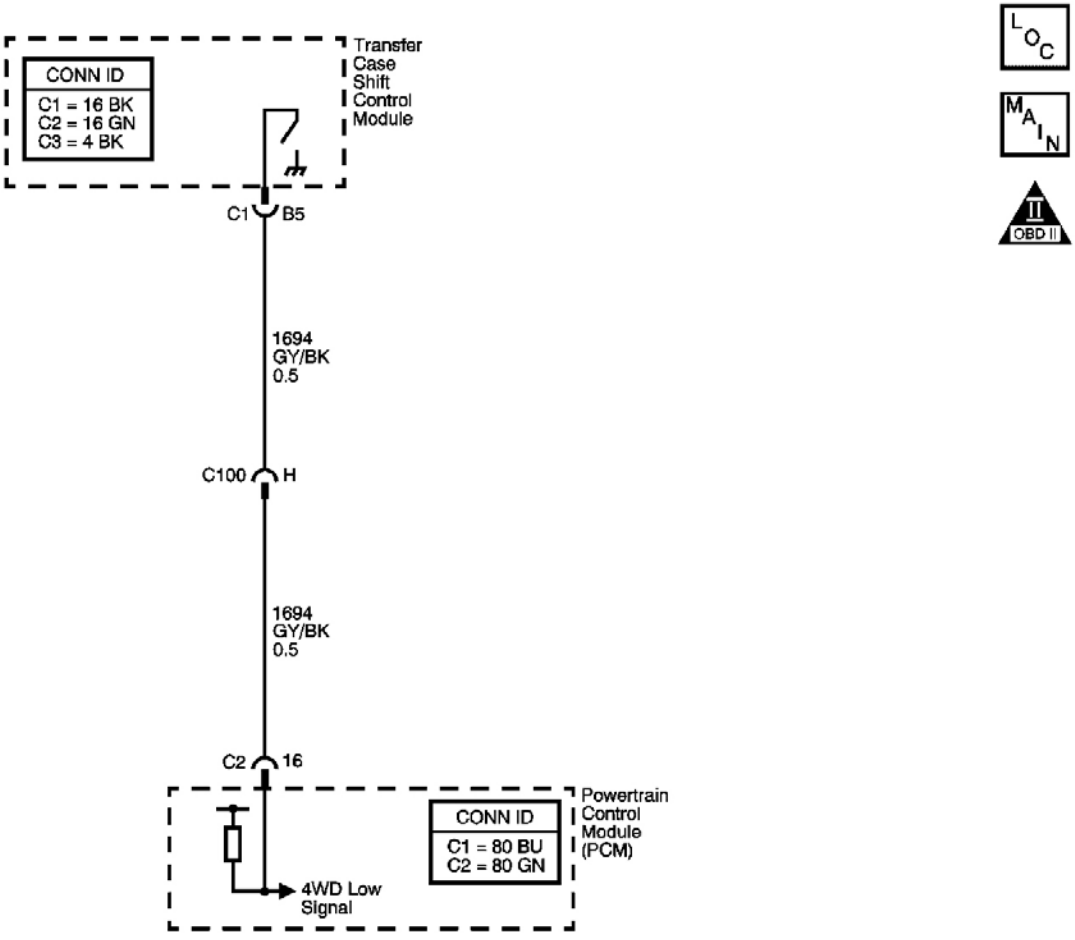

Fig. 24: Four Wheel Drive (4WD) Low Circuit Diagram
Courtesy of GENERAL MOTORS CORP.

Circuit Description

The four wheel drive (4WD) low circuit consists of the powertrain control module (PCM), a transfer case control module and the circuit wiring. The transfer case control module controls the 4WD low signal on the low signal circuit. When the operator selects 4WD low, the transfer case control module grounds the signal circuit, and the 4WD low signal voltage on the circuit changes from ignition voltage to zero volts. The PCM then compensates for transfer case gear reduction in the transmission output shaft speed (OSS) sensor signal. The PCM uses the transmission OSS sensor signal to adjust shift points, line pressure and torque converter clutch (TCC) scheduling.

When the PCM detects a continuous open, short to ground or short to power in the 4WD low circuit, then DTC P2771 sets. DTC P2771 is a type B DTC.

Conditions for Running the DTC

- No TP sensor DTCs P0122, or P0123.
- No VSS assembly DTCs P0502 or P0503.
- No TCC solenoid valve DTC P0740.
- No TCC stuck ON DTC P0742.
- No 1-2 SS valve DTCs P0751 or P0753.
- No 2-3 SS valve DTCs P0756 or P0758.
- No TFP manual valve position switch DTC P1810.
- No TCC PWM solenoid valve DTC P2761.
- The engine speed is greater than 450 RPM for 5 seconds.
- The engine is not in fuel cutoff.
- The vehicle speed is greater than 11 km/h (7 mph).
- The TP angle is 17-50 percent.
- The engine torque is 54-542 N.m (40-400 lb ft).
- The gear range is D4.
- The shift solenoid performance counters are zero.
- The TFT is 20-130°C (68-266°F).

Conditions for Setting the DTC

DTC P2771 sets if one of the following conditions occurs:

Condition 1

- The 4WD low switch is in 4WD low.
- The transfer case is not in 4WD low.
- The TCC slip speed is -3,000 to -50 RPM.
- The transfer case ratio is 0.08-1.2, the transfer case ratio is the engine speed divided by the transfer case output speed.
- All conditions are met for 5 seconds.

Condition 2

- The 4WD low switch is not in 4WD low.
- The transfer case is in 4WD low.
- The TCC is commanded ON.
- The TCC slip speed is 100 to 3,000 RPM.
- The transfer case ratio is 2.5-2.9.
- All conditions are met for 10 seconds.

Action Taken When the DTC Sets

- The PCM illuminates the malfunction indicator lamp (MIL) during the second consecutive trip in which the Conditions for Setting the DTC are met.
- The PCM commands a normal shift pattern, not a 4WD low shift pattern.
- The PCM records the operating conditions when the Conditions for Setting the DTC are met. The PCM stores this information as Freeze Frame and Failure Records.
- The PCM stores DTC P2771 in PCM history during the second consecutive trip in which the Conditions for Setting the DTC are met.

Conditions for Clearing the MIL/DTC

- The PCM turns OFF the MIL during the third consecutive trip in which the diagnostic test runs and passes.
- A scan tool can clear the MIL/DTC.
- The PCM clears the DTC from PCM history if the vehicle completes 40 warm-up cycles without an emission-related diagnostic fault occurring.
- The PCM cancels the DTC default actions when the fault no longer exists and/or the ignition switch is OFF long enough in order to power down the PCM.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

3: This step tests for a short to ground in the 4WD low signal circuit.

4: This step tests for an open in the 4WD low signal circuit or a faulty transfer case control module.

DTC P2771

Step	Action	Value (s)	Yes	No
1	Did you perform the Diagnostic System Check - Engine Controls?	-	Go to **Step 2**	Go to **Diagnostic System Check - Engine Controls** in Engine Controls - 6.0L (LQ4)
	1. Install a scan tool. 2. Start the engine, parking brake disengaged. **IMPORTANT:** **Before clearing the DTC, use the scan tool in order to record the Freeze Frame and Failure Records. Using the Clear Info function erases the Freeze Frame and Failure Records from the PCM.** 3. Record the DTC Freeze Frame and Failure			

2	Records. 4. Clear the DTC. 5. Place the transmission in NEUTRAL. 6. Select 4HI on the transfer case selector. **IMPORTANT:** **It may be necessary to drive the vehicle slightly forward to engage 4LO on the transfer case.** 7. Select 4LO on the transfer case selector. Does the scan tool 4WD Low display Disabled when you select 4HI, then Enabled when you select 4LO?	-	Go to **Intermittent Conditions** in Engine Controls - 6.0L (LQ4)	Go to **Step 3**
3	1. Turn OFF the ignition. 2. Disconnect the transfer case control module connector C1. 3. Turn ON the ignition, with the engine OFF. Does the scan tool 4WD Low indicate Enabled?	-	Go to **Step 6**	Go to **Step 4**
4	1. Connect C1-B5 of the transfer case control module connector to ground. 2. Observe the scan tool 4WD Low. Does the scan tool 4WD Low indicate Enabled when the 4WD low signal circuit (1694), is grounded?	-	Go to **Step 5**	Go to **Step 7**
5	Replace the transfer case control module. Refer to **Transfer Case Shift Control Module Replacement** in Transfer Case - BW - 4484. Did you complete the replacement?	-	Go to **Step 9**	-
6	Test the 4WD low signal circuit for a short to ground. Refer to **Testing for Short to Ground** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring Systems. Did you find and correct the condition?	-	Go to **Step 9**	Go to **Step 8**
7	Test the 4WD low signal circuit for an open. Refer to **Testing for Continuity** and extxref document="029_body-21" filetype="sgml" extrefid="i162420">Wiring Repairs in Wiring	-		

	Systems. Did you find and correct the condition?		Go to **Step 9**	Go to **Step 8**
8	Replace the PCM. Refer to **Powertrain Control Module (PCM) Replacement** in Engine Controls - 6.0L (LQ4). Did you complete the replacement?	-	Go to **Step 9**	-
9	Perform the following procedure in order to verify the repair: 1. Select DTC. 2. Select Clear Info. 3. Operate the vehicle under the following conditions: 1. Select 4LO on the transfer case selector. 2. Drive the vehicle in D4. 3. Verify that the speed ratio is 2.5-2.9 for 1.5 seconds. 4. Select 2HI or 4HI on the transfer case selector. 5. Drive the vehicle in D4 with the TCC ON. 6. Verify that the speed ratio is 0.8-1.2 for 5 seconds. 4. Select Specific DTC. 5. Enter DTC P2771. Has the test run and passed?	-	Go to **Step 10**	Go to **Step 2**
10	With the scan tool, observe the stored information, capture info, and DTC Info. Does the scan tool display any DTCs that you have not diagnosed?	-	Go to **Diagnostic Trouble Code (DTC) List** in Engine Controls - 6.0L (LQ4)	System OK